



Calhoun: The NPS Institutional Archive

DSpace Repository

Theses and Dissertations | 1. Thesis and Dissertation Collection, all items

1981

Military service as a determinant of post-service earnings

Chamarett, Stephen Garnet

http://hdl.handle.net/10945/20607

Downloaded from NPS Archive: Calhoun



http://www.nps.edu/library

Calhoun is the Naval Postgraduate School's public access digital repository for research materials and institutional publications created by the NPS community. Calhoun is named for Professor of Mathematics Guy K. Calhoun, NPS's first appointed -- and published -- scholarly author.

Dudley Knox Library / Naval Postgraduate School
411 Dyer Road / 1 University Circle
Monterey, California USA 93943

MILITARY SERVICE AS A DETERMINANT OF POST-SERVICE EARNINGS

Stephen Garnet Chamarette

NAVAL POSTGRADUATE SCHOOL
Monterey, California



THESIS

MILITARY SERVICE AS A DETERMINANT
OF POST-SERVICE EARNINGS

by

Stephen Garnet Chamarette

June 1981

Thesis Advisor: G. Thomas

Approved for public release; distribution unlimited.

T199258

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER
2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER

4. TITLE (and Subtitle)
Military Service as a Determinant of Post-Service Earnings

5. TYPE OF REPORT & PERIOD COVERED
Master's Thesis; June 1981

6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s)
Stephen Garnet Chamarette

8. CONTRACT OR GRANT NUMBER(s)

9. PERFORMING ORGANIZATION NAME AND ADDRESS
Naval Postgraduate School
Monterey, California 93940

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

11. CONTROLLING OFFICE NAME AND ADDRESS
Naval Postgraduate School
Monterey, California 93940

12. REPORT DATE
June 1981

13. NUMBER OF PAGES
157

14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)

15. SECURITY CLASS. (of this report)
Unclassified

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)
Veterans post-service earnings
Economic benefits from military service
Human Capital Theory
Investment in human capital

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The relationship between military service and post-service earnings was analyzed using the 1976 data of the National Longitudinal Survey of Young Men (14 to 24 years of age in 1966). The sample was broken down by race and veteran status. When earning attributes were examined it was found black veterans on average were socio-economically better off than black non-veterans, while the reverse was true for whites. This era, which included

#20 - ABSTRACT - (CONTINUED)

draftees, lottery selectees, and volunteers, failed to produce a military which was representative of society. The post-service earnings analysis indicates that the effect of military service on subsequent civilian income was negative. This was particularly true for those veterans who failed to use the military's in-service or post-service opportunities to further their general level of education or undertake vocational training. In sum, a term in the military has a more positive earnings effect than civilian unemployment, but a more negative earnings effect than civilian employment.

A major recommendation is that programs withdrawing members from the civilian sector for extended periods need to compensate adequately those members either during or after service.

Approved for public release; distribution unlimited.

Military Service as a Determinant of Post-Service Earnings

by

Stephen Garnet Chamarette
Major, Royal Australian Army Ordnance Corps
B.Ec., University of Western Australia, 1974

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL

June 1981

ABSTRACT

The relationship between military service and post-service earnings was analyzed using the 1976 data of the National Longitudinal Survey of Young Men (14 to 24 years of age in 1966). The sample was broken down by race and veteran status. When earning attributes were examined it was found black veterans on average were socio-economically better off than black non-veterans, while the reverse was true for whites. This era, which included draftees, lottery selectees, and volunteers, failed to produce a military which was representative of society. The post-service earnings analysis indicates that the effect of military service on subsequent civilian income was negative. This was particularly true for those veterans who failed to use the military's in-service or post-service opportunities to further their general level of education or undertake vocational training. In sum, a term in the military has a more positive earnings effect than civilian unemployment, but a more negative earnings effect than civilian employment.

A major recommendation is that programs withdrawing members from the civilian sector for extended periods need to compensate adequately those members either during or after service.

TABLE OF CONTENTS

I. INTRODUCTION ---------- 12

A. INTRODUCTION ---------- 12

B. PROBLEM ---------- 13

II. REVIEW OF BACKGROUND STUDIES ---------- 17

A. INTRODUCTION ---------- 17

B. HUMAN CAPITAL THEORY ---------- 17

C. HUMAN CAPITAL INVESTMENT BY MILITARY SERVICE ---------- 20

D. OVERVIEW OF PAST STUDIES ---------- 21

E. STUDIES REVIEWED ---------- 22

1. Cutright (1972) ---------- 22

2. Norrblom (1976) ---------- 23

3. University of Texas Studies ---------- 24

4. Little and Fredland (1980) ---------- 25

5. DeTray (1980) ---------- 26

6. Bolin, Hess and Little (1980) ---------- 28

F. SUMMARY OF STUDIES ---------- 29

III. METHODOLOGY, DATA BASE AND SAMPLE SELECTION --- 35

A. INTRODUCTION ---------- 35

B. REPRESENTATIVENESS OF VETERAN COHORT ------ 35

1. Individual Traits ---------- 36

2. Family Circumstance ---------- 37

3. Personal Characteristics ---------- 38

4. Job Environment ---------- 39

C. EARNINGS EFFECT OF MILITARY EXPERIENCE ------ 40

D. SERVICE SPECIFIC EFFECTS ------------------- 42

E. DATA BASE ---------------------------------- 43

F. SAMPLE SELECTION --------------------------- 45

G. SUMMARY ------------------------------------ 48

IV. REPRESENTATIVENESS ---------------------------- 52

A. INTRODUCTION ------------------------------- 52

1. Difference of Means Test --------------- 52

2. Chi-Square Test ------------------------ 52

3. Kolmogorov-Smirnov Test ---------------- 53

B. CRITERION VARIABLE ------------------------- 54

1. Veteran Status ------------------------- 54

C. EARNING FACTORS FOR VETERANS VERSUS NON-VETERANS ------------------------------- 55

1. Hourly Rate of Pay --------------------- 55

2. Annual Income ------------------------- 59

3. Marriage, Health, SMSA, Region and Vocational Training --------------------- 62

4. Age in 1976 ---------------------------- 71

5. Education ------------------------------ 74

6. Tenure --------------------------------- 77

7. Weeks of Employment -------------------- 80

8. Mental Ability ------------------------ 83

9. Socio-economic Status ------------------ 86

10. Hours Worked Per Week ----------------- 87

D. EARNING FACTORS SUMMARY -------------------- 90

1. Blacks --------------------------------- 95

2. Whites --------------------------------- 96

E. CONSTRUCTED EARNING PROFILES ---------- 96

F. SUMMARY AND CONCLUSIONS ---------- 103

V. REGRESSION ANALYSIS WITH VETERAN STATUS -------- 105

A. INTRODUCTION ---------- 105

B. THE MODELS ---------- 105

C. THE VARIABLES ---------- 107

1. Dependent Variables ---------- 109

2. Independent Variables ---------- 109

3. Variable Correlation ---------- 111

4. Variable Assumptions ---------- 111

D. RESULTS OF THE BASIC MODEL ---------- 116

1. Blacks ---------- 119

2. Whites ---------- 120

E. SUMMARY ---------- 123

VI. SPECIFIC MILITARY INFLUENCES ON POST SERVICE EARNINGS ---------- 127

A. INTRODUCTION ---------- 127

B. THE MODELS ---------- 128

C. THE VARIABLES ---------- 128

1. Branch of Service ---------- 130

2. Race ---------- 130

3. Military Specific Variables ---------- 131

D. RESULTS ---------- 136

1. Model 1 ---------- 139

2. Model 2 ---------- 140

E. SUMMARY ---------- 144

VII. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS --------- 146

A. SUMMARY ---------- 146

B. CONCLUSIONS ---------- 148

C. RECOMMENDATIONS ---------- 150

LIST OF REFERENCES ---------- 152

INITIAL DISTRIBUTION LIST ---------- 156

LIST OF FIGURES

FIGURE

1. Relation of Earnings to Age ---------- 18

2. Annual Income Broken Down by Veteran Status and Race ---------- 49

3. Annual Income Broken Down by Veteran Status and Race After Veteran Criterion is Applied -- 50

4. Annual Income Broken Down by Veteran Status and Race After Veteran and Full Employment Criteria are Applied ---------- 51

5. Hourly Pay Rate by Age, Race and Veteran Status ---------- 101

6. Annual Income by Age, Race and Veteran Status ---------- 102

LIST OF TABLES

TABLE

1. A summary of Studies Reviewed ---------- 31
2. Variables used in Studies Reviewed ---------- 34
3. Hourly Rate of Pay by Veteran Status by Race --- 56
4. Annual Income by Veteran Status by Race -------- 60
5. Marriage by Veteran Status by Race ---------- 64
6. Health by Veteran Status by Race ---------- 65
7. SMSA by Veteran Status by Race ---------- 67
8. Region by Veteran Status by Race ---------- 69
9. Vocational Training by Veteran Status by Race -- 70
10. Age in 1976 by Veteran Status by Race ---------- 72
11. Education by Veteran Status by Race ---------- 75
12. Tenure by Veteran Status by Race ---------- 78
13. Weeks of Employment by Veteran Status by Race -- 81
14. Mental Ability by Veteran Status by Race ------- 84
15. Socio-Economic Status by Veteran Status by Race ---------- 88
16. Hours Worked Per Week by Veteran Status by Race ---------- 91
17. Summary of Variable and Test Results ---------- 93
18. Hourly Rate of Pay by Veteran Status by Race by Age ---------- 99
19. Annual Income by Veteran Status by Race by Age - 100
20. Regression Models ---------- 110
21. Correlation Coefficients for Blacks with LOGPAY and LOGINCO ---------- 112

TABLE

22. Correlation Coefficients for Whites with LOGPAY and LOGINCO ---------- 114

23. Regression Analysis Hourly Rate of Pay and Annual Income for Blacks ---------- 117

24. Regression Analysis Hourly Rate of Pay and Annual Income for Whites ---------- 118

25. Veteran Coefficient Overtime for Income for Whites ---------- 122

26. Binary Coding of Branch of Service ---------- 131

27. Variables Utilized in the Military Models -------- 133

28. Descriptive Statistics of the Variables in the Military Model ---------- 134

29. Regression Results of Military Models ---------- 137

30. Correlation Coefficients of Military Models ------- 138

I. INTRODUCTION

A. INTRODUCTION

The Department of Defense (DoD) is the single largest employer of youth in America. With the inception of the All Volunteer Force (AVF) in 1973, the military has been required to compete in the labor market to recruit approximately 350,000 young men and women each year to meet its authorized strength. Approximately ninety percent of those young men and women will be between 17 and 21 years of age. This is a critical period in the development of their personal and vocational goals.

In excess of ninety percent of these young men and women will attend a formal course of instruction in the skills required for their specialized military occupation [Gay, 1978]. This will be followed by intensive on-the-job training and possibly advanced training at a later date. Except for the public educational system, the military training organization is the largest training system in America. In 1977 the Congressional Budget Office estimated that training costs at formal military training centers and academic institutions were at least $6.25 billion. In addition, it was estimated that at any one time 18 percent of all active duty military personnel are involved in the training system as students, instructors, or supporting staff. This estimate did not include on-the-job and unit training activities. For this

reason the armed forces have continually emphasized their ability to provide valuable job training and work experience to the potential recruit.

Clark and Sloan (1964) indicate that 85 percent of all enlisted personnel job specialities have a direct civilian counterpart. Also, 60 percent of all military training and education had direct application to civilian life. Weinstein (1967) found approximately 50 percent of all enlisted job specialities fall into the skilled category. Thus, it is not surprising why many young people see the military as an attractive method of gaining work skills and experience.

Approximately 78 percent [Binkin, M., and Kyriakopoulos, 1979], of enlistees do not complete more than one tour of duty. Therefore, the returns in subsequent civilian employment that accrue to an individual as a result of his military service is of considerable interest to both the potential enlistee and the military recruiter. Clearly, if there were lifetime civilian earning benefits to be gained through military service, recruitment would be enhanced.

B. PROBLEM

Research to estimate the benefits of military service began in the late sixties as part of the debate over conscription versus the All Volunteer Force. Recent impetus for further research in the area has been a result of calls for the reintroduction of the draft or national service to raise military manpower. Demographic and economic trends for the 1980's indicate that the military may have difficulty in recruiting

suitable young males. As the supply of males 17 to 21 years of age reduces, substantial increases in wages and incentives will be required for the military to remain competitive and obtain the quality and quantity of young people needed.

Besides the political and emotional reactions that arise with consideration of conscription or national service, there are some very real economic and social issues of "who serves when all don't" and the "tax or benefit to those who serve". Unfortunately, there have been no conclusive findings on the earnings effect of military service due to the variety of data sources and methodologies employed. Many of the studies of the sixties were conducted by economists, Oi (1967), Renshaw (1960), Hansen and Weisbrod (1967), who found that the effect of military service on earnings was negative. In contrast, later studies by Little and Fredland (1979), Martindale and Poston (1979) and Lapreato and Poston (1977) found socio-economic benefits accruing to veterans. The benefits were especially attributed to minority veterans who had used their military training to improve their socio-economic status. Most of these studies have been criticized on the fact that they were short term in nature and did not adequately address life cycle benefits. If military training does provide post service premiums, this knowledge could be utilized to attract enlistees on the basis that military service is an alternative method of investing in human capital, in a manner similar to education or specific vocational training. Similarly, policies like "Project 100,000" could be supported and

justified on socio-economic grounds that the military is an appropriate employer for developing civilian employment enhancing skills for less employment qualified youths.

Human capital theory is the basis for this thesis and is briefly reviewed in the following chapter. The major studies concerning the economic benefits in post service employment are also described in the next chapter. Using these studies as a framework, three hypotheses were developed and tested.

The first hypothesis questioned whether earnings related factors possessed by veterans were similar to the population from which they were drawn. The second and third hypotheses attempt to identify earning returns to veterans, based on these factors and specific aspects of military service. If military training and work experience is to be attributed as a means of accumulating human capital, then those who undertook military service should show positive earnings premiums over individuals with similar attributes who chose not to enter the military. Thus, the presence or absence of an earnings premium will be used to judge th value of military service in subsequent civilian employment.

This thesis will present a review of current studies undertaken in this area in Chapter II. Chapter III details the methodology, data base and the sample selection process used in the thesis. After Chpater III are the three analytical chapters. Chapter IV tests the first hypothesis and is a detailed examination of the sample when disaggregated by race and veteran status. Following this in Chapter V is the multiple

regression analysis to ascertain the economic returns to veteran status. Finally Chapter VI examines the different patterns of military participation in influencing port service earnings. The last chapter gives the summary, conclusions and recommendations of the thesis.

II. REVIEW OF BACKGROUND STUDIES

A. INTRODUCTION

The first part of this chapter reviews human capital theory. Most of the recent and initial developments in this field can be specifically attributed to the contributions made by Schultz (1963), Mincer (1974), and Becker (1975). Following the discussion of human capital theory, a number of current studies on socio-economic returns to veterans are examined to idtify their purpose, methodology, and results.

B. HUMAN CAPITAL THEORY

Generally, the word "capital" connotes the ability to use accumulated stock of natural or man-made goods for the further production of goods. Human capital refers to the levels of skills and training possessed by individuals [Fleisher and Kniesnen, 1980]. With the realization that the formation of human capital is important both to individual and societal economic growth and stability, economists, sociologists, educators and psychologists have increasingly devoted their talents to the broad range of human resource problems. This research has been accompanied by increasingly large governmental expenditures in such areas as education, health, welfare, migration, and manpower programs. The relationship between expenditure on human capital for increased national product and increased national wealth is thus well established.

Becker's (1975) analysis of costs and benefits or returns to investment in human capital is now a widely used method of studying human capital formation. He uses the human capital approach not only to help explain differences in earnings over time and among geographic areas, but also among individuals within an area. Thus he provides a powerful link between earnings ability and the incentive to invest in human capital.

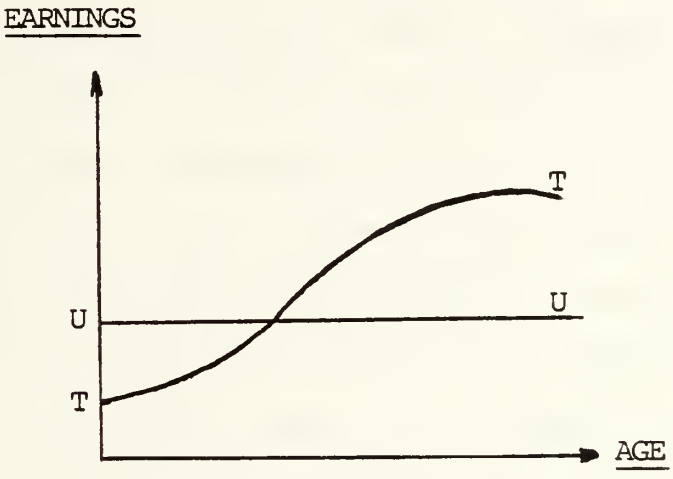


Figure 1: Relation of Earning to Age

From Figure 1, the horizontal line UU indicates earnings of untrained individuals regardless of age. The TT curve shows earnings of individuals who are trained. In this case, trained persons receive lower earnings initially because the costs of training are being paid.

Costs for formal educational programs may be actual costs or opportunity costs. For on-the-job training (OJT), costs are measured indirectly by the lower productivity of the worker during the learning period and the cost of supervision

by his superiors. Higher earnings at a later stage are possible with increased experience and training gathered over time (age). Thus returns to training are found to accrue to the individual. Investments in human capital create an increasing differential of the age-income structure of more qualified manpower vis-a-vis less qualified personnel.

In particular, Becker distinguished between general training which is useful and readily transferable to many firms, and specific training which tends to increase productivity more exclusively in the particular firm or organization providing the training. Consequently, the cost of general training would be borne by the individual receiving the training, while specific training would be paid for by the firm. Most training is neither completely specific nor completely general. To the military recruit who is not intent on being a careerist, general training is probably more important than specific training. General training will be more transferable to the civilian sector, whereas specific military skills will have little value in the civilian labor market.

Becker's analysis of Human Capital Theory offers a unified explanation to the following phenomena:

1. Earnings typically increase with age at a decreasing rate. The rate of increase is positively related to the level of skill.

2. Unemployment rates are inversely related to the level of skill.

3. The distribution of income is positively skewed, especially for professional and skilled workers.

4. Abler persons receive more education and training than others.

These aspects are important and can be related to studies that examine the effects of military training and work experience on post service employment and earnings. In particular, if the above basic points of human capital theory are accepted, then age, weeks of employment, education, and training should result in positive returns for additional units possessed of each factor.

In summary, human capital theory is the study of individual wage determination. The model proposes that the wage paid to each worker is determined by the education and skill possessed by that worker which enhances his productivity. This means that the worker who has obtained specific training skills or even general training, through on-the-job training (OJT), and work experience, should receive a wage premium above those of less qualified workers.

C. HUMAN CAPITAL INVESTMENT BY MILITARY SERVICE

The military not only gives specific skill training in many jobs that have a direct civilian counterpart, but is also said to promote desirable, and valuable job qualities [Browning et al., 1973]. Qualities often attributed to military training are: the development of positive attitudes, self-discipline, fitness, teamwork, loyalty, safety and security consciousness, geographic mobility, initiative, independence, and confidence. All of these qualities are generally recognized

as enhancing productivity and employability. In addition to military experience promoting these environmental work factors, service members are required to meet entrance criteria. These physiological and psychological tests and the requirement of a criminal free record provide a screening mechanism indicating to employers that veterans are "quality" personnel.

If the military does develop these qualities and provides a certification standard, human capital theory would indicate that veterans would receive a wage premium in subsequent civilian employment. Thus, military service could be established as an alternative method of investing in human capital because the training and work experience obtained were not only readily transferable to the civilian sector, but were recognized by the wage premium employers were willing to pay.

D. OVERVIEW OF PAST STUDIES

Most of the early studies by economists, Oi (1967), Renshaw (1960), Hansen and Weisbrod (1967) have concluded that the economic effect of military service has been detrimental to enlistees. These studies were based on earning differences (the opportunity cost or loss) sustained by individuals while in the military. Given the low wages being paid to the military during the draft period, the results indicated there was a "conscription tax" placed on those who served.

The best possible indication as to the cost and benefits of military service would be to randomly assign individuals

to groups then compare earnings before, during, and after military service to develop a life time earnings path. Unfortunately, longitudinal earnings data on randomly assigned groups are not available. Although some of the studies reviewed do attempt to reduce this deficiency by using longitudinal multivariate analysis, most studies are cross-sectional in nature.

E. STUDIES REVIEWED

1. Cutright (1972)

Cutright states there are five possible positive effects of military service that may contribute to post service earnings:

a. The geographic military effect. Cutright proposed veterans reared in the south were probably more likely to leave this low wage area, as a result of their military service.

b. The credential effect. An honorable discharge may serve as an indicator to employers that veterans were reliable, had work experience, and possessed the minimum military service educational standards.

c. In-service vocational training. This may provide some men with skills for civilian jobs which they may not otherwise have obtained.

d. Post-service training. The G.I. Bill opportunities may give veterans an advantage in the civilian market which may not have been possible had they not undertaken military service.

e. Psychological benefits. All the intangible attributes of military service. For example, the belief that "the Army builds men."

Negative effects identified by Cutright, other than the physical and psychological effects of war, were low military

earnings and delays imposed by military service in the completion of education and training.

Cutright's sample only contained men who were draftees and non-veterans born between 1927 and 1934. Calculating average incomes earned in 1958 and 1964, while statistically controlling for intelligence using Armed Forces Qualification Test Scores, he compared the veteran and non-veteran groups. The 1958 income was approximately three to four years after service discharge while the 1964 figures gave incomes nine to ten years after active service. His conclusions were that earnings of veterans are not higher than the earnings of comparable non-veterans. In particular, he concluded that any military or comparable civilian program that removed men from the labor market for an extended period of time would depress post-program earnings.

2. Norrblom (1976)

This study reported the effects of formal military vocational training and on-the-job training acquired while working in a military speciality. The results indicated that formal military vocational training had a significant upward impact on wages of individuals who entered a related civilian occupation. However, Norrblom found that on-the-job training in military specialities that were parallel to current civilian occupations of veterans had no significant impact on post service earnings. Additionally Norrblom found that returns to on-the-job training acquired in the civilian sector were

significantly larger than previously thought. Unfortunately, her study only included veterans, so it was not possible to determine any net advantages accruing to veterans over non-veterans as a result of military training.

3. University of Texas Studies

Three studies by Browning, Lapreato and Poston (1973), Lapreato and Poston (1977) and Martindale and Poston (1979), indicate that military service may provide a "bridging environment" for minority groups that result in socio-economic advantages in the post service period. These studies propose that the military not only provides opportunities for occupational training, education, and geographic mobility, but also assists individuals to obtain personal independence, confidence, and the ability to experience bureaucratic structures. Military experience is said to be a critical factor that enable minority veterans to obtain better paid civilian jobs in the post service period.

While all studies used similar methodology and confirmed previous results, the latest of the studies were the most extensive. This study conducted a comparison of earnings for veterans and non-veterans for World War II, Korea, and Vietnam. The results indicate that minority veterans for all three wars had accrued premiums that could be attributed to military service. However, white veterans of the Vietnam period experienced an earnings penalty.

Martindale and Poston only controlled for education, employment and marital status as income earning factors.

Their studies failed to control for tenure, and training, two variables that have considerable impact on income. However, their study did highlight other important variables, such as the influence of the socio-political climate. Therefore it is suggested that veterans of the different wars not only faced different selection procedures, but also had to contend with different social and economic conditions on their return.

Thus it is important when examining the results on any study on post service benefits to analyze both the "representativeness" of the veteran sample and the prevailing economic conditions. Most studies fail to clearly indicate or control for veterans superiority or inferiority in many factors that contribute to earnings. Table 1 gives a concise summary of the three University of Texas studies.

4. Little and Fredland (1980)

Little and Fredland (1980) hypothesized that military service itself serves as a general training variable adding to one's investment in human capital and therefore contributes to post service earnings. Their results were obtained from the 1966 NLS survey of men aged between 45 and 59 in 1966 and indicate that regardless of race, veterans had significantly higher average earnings than non-veterans. Using regression analysis, they conclude that schooling completed and job tenure had positive effects on income, but age had a negative effect. This appears to be inconsistent in that OJT and

firm specific training gained with age would improve productivity. The models used by Fredland and Little were the traditional linear and semi-log formulations:

$$\text{Linear:} \quad Y = b_1 + b_2X_2 \ldots b_nX_n$$

$$\text{Semi-log:} \quad Y = e^{b_1X_1 \ldots b_nX_n}$$

The models utilized both wages and salaries, and annual income as dependent variables. A summary of the independent variables employed are given in Table 2.

A possible explanation of the positive results accruing to veterans is the composition of the sample. World War II veterans served in a period of no college exemptions and little draft avoidance. This resulted in a good cross section of the population serving in the military [Fligstein, 1980] and [Moskos, 1970]. In addition, veterans returned home as popular heros to valuable G.I. Bill benefits. That era also saw a period on industrial expansion and economic growth which provided good employment opportunities. Moreover, since Little and Fredland used a cross-sectional analysis that looked at veterans and non-veterans incomes reported for one year (1966), twenty years after the war, lifetime benefits to veterans could not be established. It would be incorrect however to infer a veteran premium for each year since a service member's return to the civilian sector.

5. DeTray (1980)

DeTray's (1980) study led him to the conclusions that:

a. Veterans earn more than non-veterans.

b. Training received in the military increases civilian wages when innate differences are controlled.

The model hypothesized by DeTray was;

$$Ln(W) = a_0 + a_1E + a_2X + \sum a_i\ OF_i$$

where Ln(W) is the natural log of an individual's wage rate per hour, E is the level of education, X is years of job experience, and OF is the level of other factors. Job experience was broken into two factors; years of actual job experience and tenure with current employer. As shown in table 2 the other independent variables were typical of previous studies in this area.

The data set used by DeTray was the 1971 NLS of young men, 14-24 years old in 1966. He found premiums attributable to veterans status of approximately 10 percent. Due to the low number of black veterans (40), DeTray considered that little value could be placed on the negative 6 percent return to black veterans determined by his equations. One weakness of DeTray's study was the assignment of veteran status to anyone who indicated they had been in the military. This definition possibly included those who did not really experience the disruption of extended military service.

Although DeTray's work was extensive, he states that his report only hints at the direction of the likely outcome of a more complete analysis of military training.

Final and conclusive results he felt would have to wait until the full ten years of the NLS survey of young men was available.

6. Bolin, Hess and Little (1980)

The Bolin, Hess and Little (1980) study was conducted using the NLS of young men, 14-24 years old in 1966, with 1969 and 1971 data. In particular, this study addressed the effects of vocational training received in the military on post service earnings. They concluded there were no positive economic benefits to be gained through military training in the short run. Variables used in this study were similar to those of the previous studies except for the inclusion of a training variable. This variable indicated whether the member used vocational training on the job. Three different dependent variables were used: hourly pay rate, the log of hourly pay rate, and annual wages. The other independent variables were typical of previous studies and included age, education and tenure. In particular, their results indicate that veterans who did not receive vocational training in the military would have done better using their time to gain tenure in a civilian job. Like DeTray, Bolin, et al., indicate their study is limited to the short run and must await further releases of the NLS of young men to verify their study. What is of interest, however, is that both these studies, DeTray, and Bolin et al., employed the same data but had differing conclusions as to returns accruing to veterans. These studies highlight the importance of methodology and its ability to influence results.

F. SUMMARY OF STUDIES

Table 1 contains a short summary of the studies reviewed. Briefly stated are the purpose, data base, methodology and findings. In addition Table 2 details those factors or attributes that were considered in these studies.

This review reveals why results as to the benefits of military training and work experience in post-service earnings vary in their conclusions. In particular, it can be seen that most of the studies used different explanatory variables. Griliches (1977) reports that normal analysis procedures which delete discriminating variables can invalidate or confound research results. By reviewing Table 2, it is possible to hypothesize some studies may not have controlled for variables which may have influenced conclusions. This aspect is highlighted by DeTray (1980) and Bolin et al., (1980), studies which used the same data base but had conflicting results.

Cutright (1972) and Martindale et al., (1979), indicate that a selection bias in the veteran sample arises from the political and socio-economic climate of the time of enlistment. Thus the quality of persons entering the military may vary from period to period. Further, the political and economic climate at the time of discharge may also greatly influence post service opportunities. The Martindale et al., (1979) study is one of the few studies that replicates the same methodology on different cohorts to highlight the effects of a changing environment.

Possibly the greatest shortcoming of all studies reviewed are their failure to demonstrate lifetime benefits attributable to veteran or non-veteran status. At best, their use of limited longitudinal analysis can only hint or infer the likely direction of these results. The analysis of lifetime earning benefits would only be possible by conducting a longitudinal survey, from which earning profiles of individuals could be traced. Despite some of the shortcomings of the studies reviewed, each has made a valuable contribution to extend the body of knowledge as to the effects of military service on post service earnings. In addition, these studies helped formulate the basis of the methodology used in this thesis.

TABLE 1

A SUMMARY OF STUDIES REVIEWED

AUTHORS AND DATE	TITLE AND PURPOSE	DATA BASE	METHODOLOGY	RESULTS AND CONCLUSION
1. Cutright, P. 1972	Achievement, mobility & the draft: Their impact on earnings of men. Analyzed the determinants of earnings & changes in earnings to measure the effects of military service on post service earnings.	Selective Service Files, 1% sample in 1953. Linked with Social Security Data in 1958 and 1964.	Used a comparison of Army veterans & non-veterans. With controls for age, education, race and IQ (AFQT) at two time points, 1958 and 1964.	The earnings of veterans are not higher earnings for comparable non-veterans. Programs that remove men from the labor market depress post program earnings.
2. Norrblom. E. 1976	The Returns to Military & Civilian Training. Study examines the economic effects of formal military training & on-the-job training acquired while in the military.	Post Service Information File for FY71. 25% of all Army, Navy, and Air Force separatees who left military service after one term.	Regression analysis semi log function. Blacks excluded from the analysis. No comparison of veteran/non-veteran was conducted.	Formal vocational training tends to have a positive significant effect on post service wages.
3. Browning, H. Lopreato, S. and Poston, D. 1973	Income & veteran Status Variations Among Mexican Americans, Blacks and Anglos. Study the effect of military service on minority men with emphasis on the "bridging environment"	1960 Public Use Sample. 1% of all men over 14 years classified as veterans in the five southwestern states.	Used a comparison of mean income controlling for race, education and occupation.	Income advantages displayed by minority group veterans over non-veterans support the bridging environment hypothesis.

TABLE 1 (CONT.)

AUTHORS AND DATE	TITLE AND PURPOSE	DATA BASE	METHODOLOGY	RESULTS AND CONCLUSION
4. Lopreato, S. Poston, D. 1977	Differences in Earnings and Earnings Ability Between Black Veterans and Non-Veterans in the United States. Study tests effects of "bridging hypothesis" of military service.	1% sample of 1970 U.S. Census of Population aged 25 & 54.	Comparing annual earnings after running two separate regression analyses by veteran status, controlling for education. Other controls for age and employment were imposed by sample selection.	Black veterans are better able than black non-veterans to convert educational attainment into earnings advantage.
5. Martindale, M. Poston, D. 1979	Variation in Veteran/Non-Veteran Earning Patterns Among World War II, Korea and Vietnam War Cohorts. Study tests effects of civilian attainment by color and varying political & economic influences.	1% sample of 1970 U.S. Census Population Sample restricted by age & period. WW II (1940-1947) Korea (1950-1955) Vietnam (1964-1970).	Comparison of annual earning after running two separate regression analyses by veteran status, controlling for education, employment, marital status & of course, race.	Black and Mexican American Veterans are better able to convert characteristics into earnings than their non-veteran counterparts. For whites the Vietnam period gave non-veterans an income advantage.
6. Little, R. Fredland, J. 1979	Veteran Status, Earnings, & Race: Some long term results. Study examines earnings of veterans/non-veterans some 20 years after most served.	NLS of men aged 45-59 in 1966.	Regression analysis controlling for many factors that contribute to earnings. Study was cross sectional.	Veterans had a 5% to 10% premium on earnings.

TABLE 1 (CONT.)

AUTHORS AND DATE	TITLE AND PURPOSE	DATA BASE	METHODOLOGY	RESULTS AND CONCLUSION
7. DeTray 1980	Veteran Status and Civilian Earnings. A detailed examination into causes of differences in civilian earnings between veterans and men with no military service.	NLS of Young Men aged 14-24 in 1966. 1971 data set used.	Regression analysis controlling for many factors that contribute to earnings. Study was cross sectional.	Veterans earn more than non-veterans. Training received in the military increases civilian wages
8. Bolin, P. Hess, M. Little, R. 1980	Military Vocational Training: Its Impact on Post Service Earning Path. This study utilizes human capital approach to compare the values of civilian vocational training over time.	NLS of Young Men aged 14-24 in 1966, 1969 and 1971 data is used.	Regression analysis controlling for many factors that contribute to earnings, in particular the use of civilian and military training.	Use of military training does not have a positive effect. Those veterans who receive no training but have military service have a negative influence on their earnings.

TABLE 2

VARIABLES USED IN STUDIES REVIEWED

EXPLANATORY VARIABLES	CUTRIGHT 1972	NORRBLOM 1976	BROWING et al. 1973	LOPREATO et al. 1977	MARTINDALE et al. 1979	LITTLE et al. 1979	DeTRAY 1980	BOLIN et al. 1980
Age	X	X	X	X	X	X	X	X
Education	X	X	X	X	X	X	X	X
IQ/AFQT	X	X						X
Married or Dependents		X			X			X
Residence-Geographic	X	X	X	X	X	X	X	
SMSA							X	X
Comparison of Civilian Job		X	X					
Veteran vs Non-Veteran	X		X	X	X	X	X	X
Use of Military Training		X				X		X
Duncan Index						X		
Tenure						X	X	X
Experience							X	
Race	X	X	X	X	X	X		X
Health							X	X
Vocational Training							X	X
EARNINGS MEASURES								
Earnings from Wages and Salaries	X		X	X	X	X		X
Hourly Earnings		X					X	X

III. METHODOLOGY, DATA BASE AND SAMPLE SELECTION

A. INTRODUCTION

To ascertain whether military service enhances future earnings, and can therefore be considered a viable alternative method of investing in human capital, it is necessary to test the following hypotheses.

1. Personnel who enter and complete a tour of military duty are a representative sample of their cohort or population group.
2. The earnings effect of military service is no different from obtaining work experience and training in the civilian sector.
3. The type of military participation undertaken with regard to branch of service, length of service, length of training or time of service has no effect on future earnings capacity.

In this chapter it is intended to outline the methodology employed to test the above hypotheses, give details of the data base used in the study, and present the criteria applied in the selection of the sample for the analysis.

B. REPRESENTATIVENESS OF VETERAN COHORT

The first hypothesis was tested by examining a number of factors that are considered relevant by current literature as influencing the generation of income and life-cycle benefits. Each factor was examined in turn to establish if the distribution of the factor was similar in both the veteran and non-veteran sample. If all factors proved not to be statistically different, any observed difference in income could therefore

be assumed in part to be attributable to the influence of military training and experience. If some factors were distributed differently among veterans and non-veterans, then those factors would have to be included in a multivariate explanation of earning differences.

The factors chosen have been grouped under four categories: individual traits, family circumstances, personal characteristics, and job environment. The list of factors is not exhaustive, and categories are not mandatory. However, the factors include those most frequently used in the construction of a human capital earnings equation as found in the current literature. Categorical groupings for each factor involved arbitrary judgment, and were selected so as to facilitate discussion purposes.

1. Individual Traits

These are defined as factors which influence income capacity, but are generally beyond the individual's discretion to alter. The factors chosen are health, age, and intelligence. All three factors directly and indirectly affect earnings. Age is not only related to work experience and ability, but also poses limitations on the achievement of particular goals. For example, obtaining a car license, financial independence or even a particular level of schooling is not possible until the individual has reached a certain age. Similarly, health can restrict the scope and capacity of an individual to undertake a particular occupation. Many

jobs today also apply minimum psychological and physiological entry standards for selection, which may restrict the job opportunities for an individual. Moreover, failing health may also directly affect the number of hours, and weeks worked by an individual and therefore may have a considerable impact on annual and weekly earnings.

Native intelligence, like age, and health, has both a direct and an indirect influence on earnings. Intelligence has been found to be strongly related to school achievement. This in turn enables the more intelligent, and educated person greater access and opportunities to higher paid employment. In addition, intelligence is related to "trainability," which reduces training costs to employers and tends to make the member a more productive person faster.

2. Family Circumstance

Two factors have been placed under this heading. The first relates to the socio-economic home environment of the individual in his formative years. The greater the level of family wealth and education experienced by an individual, the more conducive is the atmosphere for his educational and social development. Home environment no doubt also greatly influences attitudes, and motivation to work. Positive home influences, and encouragement contribute considerably to the aspiration, and achievement levels of individuals seeking later financial rewards.

In a similar manner, marriage influences or modifies individual behavior in a positive manner. Employers attribute

a greater sense of responsibility and steadiness to married employees and to those with dependents. Job application forms and job interviews tend to confirm that employers are more willing to employ married personnel. A review of employee turnover studies by Mobley (1979) confirmed that marital status and having dependents was associated positively with tenure, while the highest turnover ratio was by employees who were single. Marriage, and dependents thus may reduce mobility and irrational "quitting" behavior. Hence, returns to employers on training is more profitable and secure.

3. Personal Characteristics

Two factors, education levels, and vocational training, are placed in this category. As seen in the literature review, both of these aspects are established as having an important relationship to income generation. Education is greatly influenced by individual intelligence and family wealth. While education may signal to employers a general capacity of an individual for training, it may also be used to indicate positive work attitudes like perseverance, diligence, and motivation. These attributes have the general effect of improving employee productivity and also enhancing the individual's employability in all jobs. Vocational training on the other hand is normally considered to be job-specific; that is, to improve individual skills and productivity in a particular occupation. In many instances, however, vocational training may also be used as a stepping stone to higher paid positions in the instructional, managerial, and supervisory

fields. These positions would have been unattainable, except for the prior vocational training undertaken.

4. Job Environment

This category includes many factors related to location and time. Two aspects of location were considered pertinent. The first is related to labor market size. Here it was assumed the size of the individual's local labor market would be influential in the range of available occupations, as well as increasing the opportunities for a competitive labor market. In addition, participation in a large labor market would assist the individual's job mobility without necessarily involving family and home movement.

Regionally, it has been found that lower wages are paid in the southern states. A variable was therefore included to account for this geographical wage differential.

It was also necessary to include job specific factors that accounted for length of service with current employer, weeks of employment, and hours worked. Length of service or tenure not only increases experience, and job expertise, but also is often rewarded by employers with increasing annual salary increments for improved productivity, and loyalty. In addition, length of service adds advantages like larger bonus payments, first choice at overtime, and in union controlled industries "first on, last off" privileges.

Aspects like number of weeks worked per year or average hours worked per week have an obvious direct relation to annual income. It was therefore necessary to account for

these variable influences when comparing the veteran and non-veteran groups. Two measures of income were also utilized, hourly rate of pay and total income from wages and salaries.

Chapter IV deals in detail with each of the above factors. It gives a precise definition for the construction of the variable and then presents the descriptive statistical data and tests for each factor.

C. EARNINGS EFFECT OF MILITARY EXPERIENCE

In Chapter V, the study uses the variables developed and defined in Chapter IV to examine the simultaneous effects of these factors in the determination of income. In particular, the multiple regression analysis presented in Chapter V is based on the logarithmic formulation of the human capital model of wage determination as developed by Mincer (1974).

There are two human capital earnings models developed in this study. Each proposes that an employees wage is determined in part by the amount employers are willing to pay for personal factors that contribute to productivity. Thus, the quality and quantity of income earning factors, naturally possessed or developed by workers, are in part responsible for their received wage and salary. These models are best formalized by the equation:

$$Ln(W) = a_o + a_1 v + \sum_i a_i (EF)_i$$

where Ln(W) is the dependent variable. In model 1, W is an individual's hourly wage rate, and in model 2 W is the

individual's annual income. In the models, v is the dummy variable indicating veteran status, and the (EF)'s are all the other earning factors that influence wages and salaries. An appeal of the logarithmic formulation is that the coefficients (the a_i's), can be interpreted as percentage changes in wages received as a result of one unit change in the independent or explanatory variables. It is also possible to interpret these coefficients as the rates of return to acquiring an additional unit of the independent or explanatory variable.

It is intended to use only "pure" data in the forward stepwise regression analysis. That is, any case that does not have all factors present will be deleted from the analysis. In addition, the derived equation will be examined to determine if the overall F value for the equation is significant, and to determine the "goodness' of fit of the equation by examining the value of the R^2.

One of the deficiencies of a cross-sectional analysis of this type is that only 1976 earnings have been examined. To determine if there are life-cycle benefits to be gained through military service, it would be necessary to undertake a longitudinal study and plot received wage rates over time. A longitudinal study would be more meaningful as it would establist a time path for individuals enabling us to assess the effect of time on military service. That is, it would be possible to see if wage differentials between veterans and

non-veterans increased or diminished over time. In an attempt to simulate time paths of earnings it is intended to disaggregate the veteran and non-veteran sample by age. This analysis would, of course, assume that all age groups are similarly affected by all other attributes. If this assumption holds, it would then be able to proxy age for time and develop a longitudinal wage curve showing the increasing or decreasing effects of veteran status over age (time).

D. SERVICE SPECIFIC EFFECTS

The final hypothesis tested whether the type of service participation by veterans was a contributing factor on post service earnings. In addition to the factors discussed earlier, variables were constructed to cover the following service aspects.

1. Branch of Service the Respondent Entered

This indicates whether the respondent served in the Navy, Army, Air Force or Maine Corps. This factor had to be considered because, on the average, the Navy and the Air Force require people of a higher level of technical skill than do the Army and the Marine Corps. Thus, the training given in these services tends to be longer and have more compatibility with civilian requirements.

2. Months of Completed Additional Military Training

Training above basic or boot camp training was considered an important factor. Not only is the member more likely to use this training as a basis for later civilian

employment, but it also indicates that he was screened by service criteria as eligible for further training.

3. Period of Time Spent in the Military

This was included as a factor because it can have two effects. Those who remain for longer periods are normally chosen to undergo further training, and may gain additional work experience and education. However, time spent in the military also detracts from time the member may be using to increase tenure and receive specific training.

4. Aging Effect of Military Service

A variable was introduced that measured the time since the member left the military service. Obviously the more distant the period of prior service, the greater the opportunity the individual has had to search for an appropriate job, use G.I. Bill benefits to undertake further education or vocational training or build up his tenure with his employer.

A statistical description of these factors is given in Chapter VI. In addition, multiple regression analysis was used to determine the significance of these factors in the generation of income.

E. DATA BASE

The data used in this analysis are from the 1976 National Longitudinal Survey (NLS) of young men who were aged 14 to 24 years in April 1966. This survey is one of many conducted by the Center of Human Resource Research of the Ohio State

University. The Center was contracted by the Office of Manpower Policy, Evaluation and Research of the United States Department of Labor to survey four age groups: Men 45 to 59, Women 30 to 44, Young Men 14 to 24 and Young Women 14 to 24 years of age. These age groups were selected to reflect the specific and different labor market problems faced by each group. For the young men, the survey was designed to obtain extensive information as to the process of schooling and vocational choice. Moreover, the NLS data represent the best available longitudinal data from which a sample of veterans and non-veterans could be drawn.

The young men's survey intended to examine closely the preparation for careers, as well as the problems encountered in adjusting to the labor market during the difficult transition period from school to employment. In addition to the respondents' labor market behavior and experience, a substantial quantity of data were collected on the respondents' personal characteristics and family circumstances. To date there are over 5,000 pieces of information on most members of the original sample.

The original NLS sample did not include anyone who was serving in the military in 1966. Fortunately, this group of 14 to 24 year olds contains the primary age group from which the military services draw recruits. Thus, actual numbers who experienced military service were sufficient for statistical analysis. The survey was initially intended to cover a period

of five years from 1966 to 1971, but was later extended by an additional five years due to the low attrition rate among respondents.

An original sample of 5,225 non-institutional young men 14 to 24 years of age was randomly selected by the Bureau of Census from sampling units that had been selected to conduct the experimental Monthly Labor Survey during 1964 and 1966. However, to ensure sufficient minorities were included, the sample was biased to over-represent minorities in the sample by a three to one ratio to their proportion in this population. To ensure results are not biased, most of the analysis presented in this study is produced separately by race.

F. SAMPLE SELECTION

Final selection of the subsets employed in the analysis was based on the following criteria.

Set 1, Veterans: This set contained survey members who were classified as veterans. Veteran status was only assigned to those members who had completed 24 months or more in the military by 1976. Veterans in this category averaged 37 months of service.

Set 2, Employed: For survey members to qualify for inclusion in this set, they were required to be fully employed in 1976. Classification of full employment had been arbitrarily set to include only those members who were working 35 hours per week or more.

Set 3, Short Term Enlistees: Those who enlisted, but did less than 24 months of service in the military were assigned set 3 status. This set of members were excluded from any further analysis, as it tended to include those who attrite from the service or those who are reservists. Thus, the final sample selected for analysis was the intersection of sets 1 and 2. This in fact meant that the sample included all those individuals who were working 35 hours or more per week and had never joined the military, or if they had enlisted had completed 24 months or more of military service.

The effect of applying these criteria is highlighted by examining Figures 2, 3 and 4. Figure 2 shows an original data base of 3627 respondents in 1976; 2395 non-veterans and 1232 individuals with some military service. The application of the two year veterans criterion reduced the usable sample to 3114 (as shown in Figure 3), of whom 2395 were non-veterans and 719 were veterans. The final sample used in all the following analyses was derived by the joint application of veteran status and full employment criteria and is shown in Figure 4. Here the total usable sample size is reduced to 2431, and is comprised of 1868 non-veterans (466 black and 1402 white), and 563 veterans (121 black and 442 white).

An examination of the average income earned by each group as the different criteria are applied is interesting in that the "some military" service group had a higher average income than the 2 year veteran group ($10,223 to $9,968). However,

when the full employment criterion was applied, the average wage for veterans rose to $11,339. There are two possible explanations. Firstly, the employment criterion removes those veterans who are still undertaking further vocational or educational training, but had part time jobs. The second explanation is that the percentage of black veterans in Figure 3, who on the average earn less than the whites, is higher than the percentage of black veterans in Figures 2 or 4. Situations of this type highlight the appropriateness of conducting this study for the black and white samples separately.

For the non-veteran sample, using the full employment criterion raised the average earning in excess of $1,700, but reduced the sample size by 527. These figures would indicate that there are many parttime workers in society. Surprisingly enough, the percentage of part employed workers was identical for both groups, and was 22% of the sample size.

A limitation of the selected sample is that there is a potential bias. There are possibly members who are still enlisted in the military who may have gained the most through military service. As the NLS does not interview respondents during their military tour, it is impossible to determine this number. In addition there was no method of determining whether the youths who undertook military service avoided periods of unemployment and were thus economically better off during their period of enlistment. However, as the main aim of the study is to assess the contribution of military service to

the future earnings of a non-careerist, this limitation does not detract from the study.

G. SUMMARY

This chapter has outlined three aspects of this study.

1. The three hypotheses to be tested, in relation to veterans and their post service earning capacity.

2. The approach and methodology to be followed in the examination of the hypotheses.

3. The selection criteria applied in drawing the veteran and non-veteran sample in this study.

Chaters IV, V and VI which follow, give greater details of the definitions of variables employed, the statistical techniques used and the results obtained from the analysis.

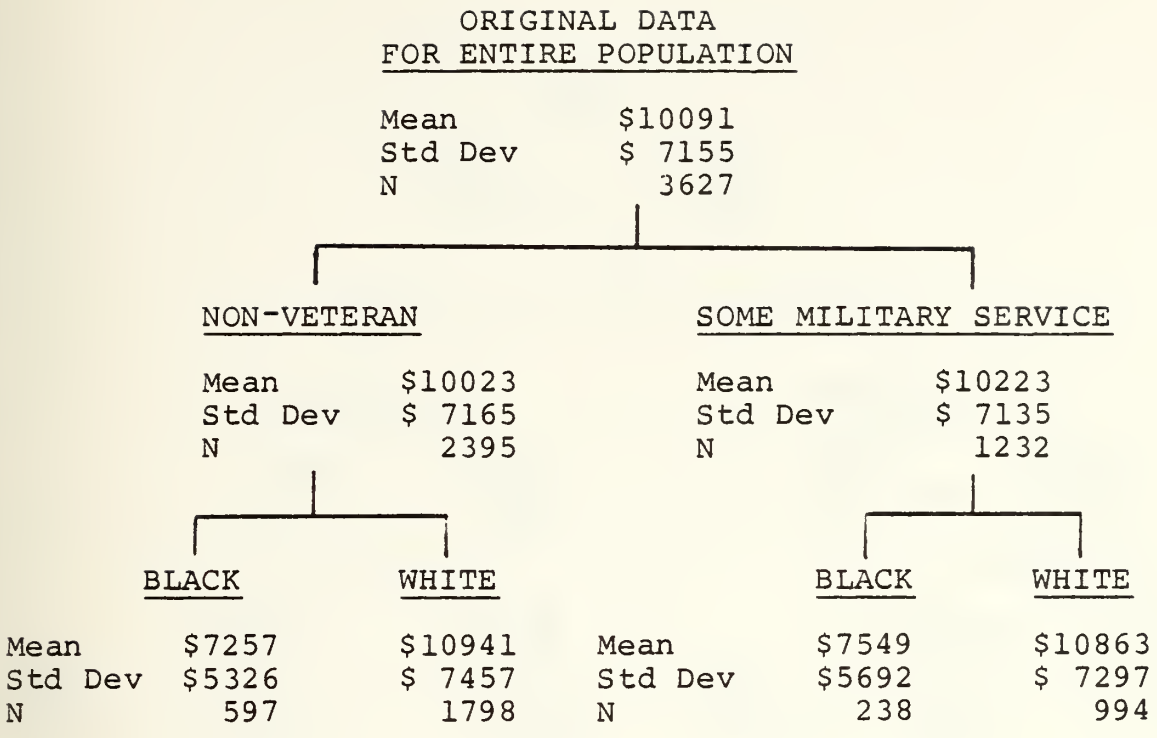


Figure 2. Annual Income Broken Down by Veteran Status and Race

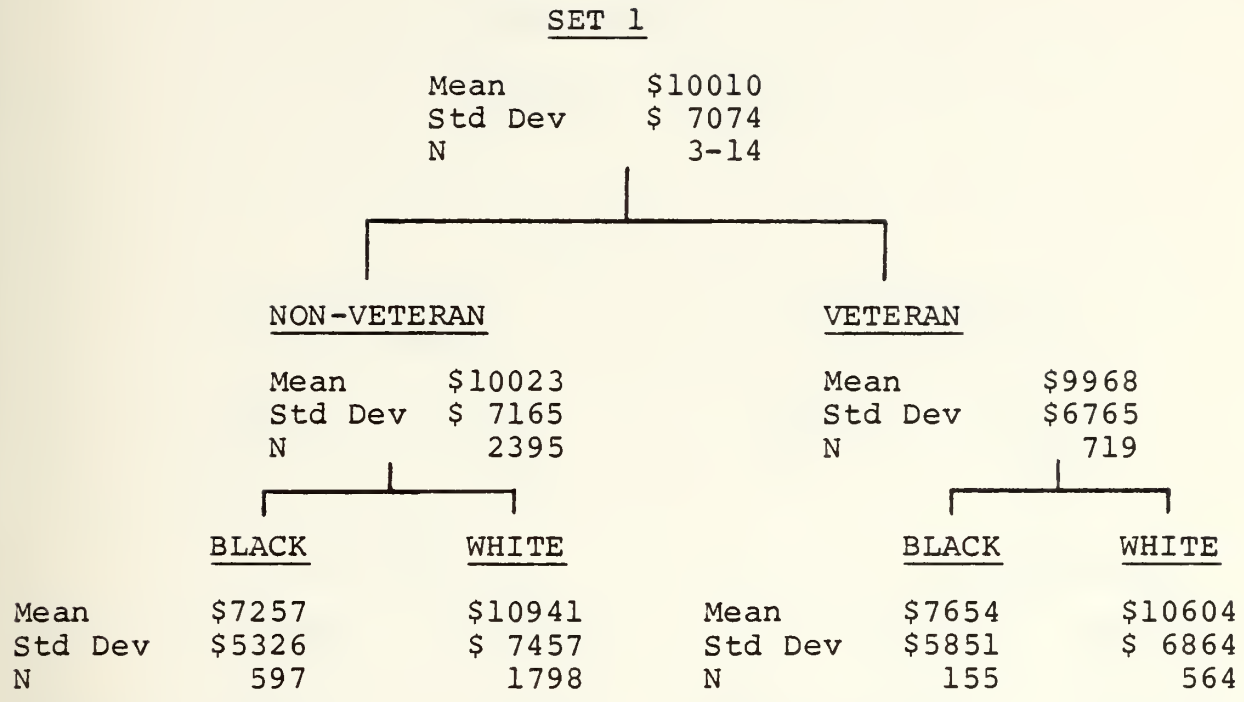


Figure 3. Annual Income Broken Down by Veteran Status and Race after Veteran Criterion is Applied

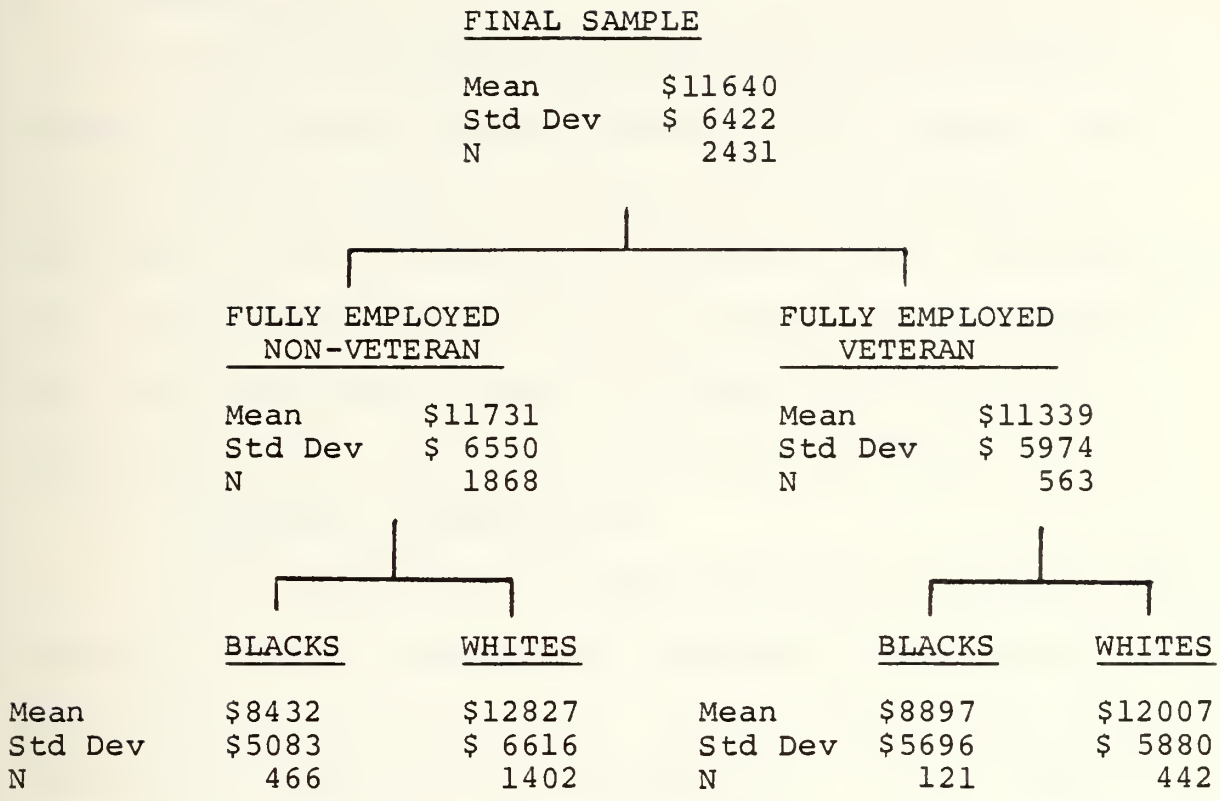


Figure 4. Annual Income Broken Down by Veteran Status and Race after Veteran and Full Employment Criteria Are Applied

IV. REPRESENTATIVENESS

A. INTRODUCTION

This chapter examines the similarities and differences between the veterans and non-veterans in the sample. Each of the factors discussed in Chapter III is analyzed as a continuous or as a categorical variable. Most of the statistical techniques used to describe and test each variable are from the Statistical Package for Social Sciences (SPSS). Specifically three test statistics were employed.

1. Difference of Means Test

All continuous or assumed continuous variables were tested by the SPSS Oneway ANOVA procedure to determine if the difference between the mean values of each variable for veterans and non-veterans was significant. These results are found at the top of each table. Each table is standardized in a format that gives the variables name, the mean, standard deviation, and sample size of the veteran or non-veteran group that was used to calculate those statistics. Next, follow the degrees of freedom (D.F.), the "F" test value, and the probability (P), that the difference could occur by chance.

2. Chi-Square Test

This utilizes a joint frequency distribution of cases, which summarizes the relationship in matrix form. Given are the actual numbers and percentages of the group sample

population found in each cell. The tabulation is statistically analyzed by the Chi-Square test of independence to determine whether a systematic relationship exists between the two variables. However, Wonnacott (1977) warns that, "when a sample is large even minuscule deviations will generate statistically significant χ^2." Therefore, the reader is warned to treat the resulting χ^2 with caution. More important, however, is that the table presents the distribution of the variables in a meaningful manner which can assist insight far greater than a mean and standard deviation.

3. Kolmogorov-Smirnov Test

Where variables were grouped to facilitate the use of the SPSS Crosstabs Program, the Kolmogorov-Smirnov two sample test was also conducted. This test determines whether two independent samples have been drawn from the same population or populations with the same distribution. In particular, the two tail test is sensitive to any kind of difference in location of means, skewness or kurtosis. Basically the test is concerned with whether there is agreement between the two cumulative distributions. The greatest difference between the two cumulative distributions is identified and tested against the greatest acceptable difference. That is, if the two samples cumulative distributions are identified as being too far apart at any category, the test results lead the researcher to infer that the samples come from different populations.

The strength of the Kolmogorov-Smirnov test is that it seems to be more powerful than the Chi-Square test [Siegel, 1956]. In addition, it is most suitable where categories have been arbitrarily set, as was done in this study. Moreover, whereas numerous categories weaken the Chi-Square test, the greater the number of categories in a Komogorov-Smirnov test, the more accurate the result.

B. CRITERION VARIABLE

1. Veteran Status

Veteran status was a dummy variable assigned a value of one for those members who had served twenty-four months or more in the military. Those who had never served in the military were assigned the value of zero. Most previous studies, due to data limitations (small number of veterans), were forced not to apply any minimum length of service requirement. The two year minimum service requirement in this study is considered an appropriate measure of military service for the following reasons:

a. Veterans have a greater period of time to receive additional or advanced training.

b. There is a longer indoctrination period for veterans to absorb those desirable work values often attributed to military work experience, and general training.

c. It removes members of the Enlisted Reserves (ER's) from the sample. These members did only six months full time service and would not have suffered the disruption of typical military service on employment, or received advanced training.

d. It removes from the "veteran sample" those personnel who are actually unsatisfactory for military service. Thomas (1977) found that in the Navy most early attrition

or discharges, within the first two years, are due to psychological and physiological deficiencies, fraudulent enlistment or criminal activities. In particular, seventy three percent of those who were discharged within the first two years left with dishonorable discharges. This would indicate substantial nonproductive behavior, among attriters. It is assumed other services would have similar figures. In addition, it is assumed that the removed service members are not "typical" of the better and more commonly found military service personnel working in later civilian employment.

e. There is a better assessment as to the possible effects of the draft. Traditionally, the two year draft period has been considered one that is economically viable to the services with regard to returns on training. A two year enlistment is also seen as minimizing the disruption to the lives of the individuals who are drafted.

C. EARNING FACTORS FOR VETERANS VERSUS NON-VETERANS

1. Hourly Rate of Pay

HRLYPAY: This continuous variable measured the respondent's hourly rate of pay at his current or last job in 1976.

HOURPAY: Is a categorical derivation of the hourly rate of pay. HOURPAY was constructed by grouping hourly pay into a number of categories. This grouping permitted the SPSS crosstabs program to be used. Table 3 gives the pertinent descriptive statistics for these variables when disaggregated by race and veteran status.

Each table in this chapter is presented with the results for blacks, followed by the results for whites. The results for each race give the mean, the standard deviation, and the sample size for the black non-veterans and veterans.

TABLE 3

HOURLY RATE OF PAY BY VETERAN STATUS BY RACE

BLACKS

HRLYPAY	Non-Veterans	Veterans	D.F.	F.	P.
Mean	$4.40	$4.77	1	3.67	.06*
Std. Dev.	1.87	1.82	565		
N	448	119			

HOURPAY	Non-Veterans	Veterans	Row Total
$0.00 to $2.99	106 23.6	17 14.3	123 21.7
$3.00 to $3.99	105 23.4	23 19.3	128 22.6
$4.00 to $4.99	93 20.8	26 21.8	119 21.0
$5.00 to $5.99	58 12.9	26 21.8	84 14.8
$6.00 to $6.99	43 9.6	15 12.6	58 10.2
GE $7.00	43 9.6	12 10.0	55 9.7
Column Total	448 79.0	119 21.0	567 100.0

$\chi^2(5) = 10.44$ significance = .06*

Kolmogorov-Smirnov Test: D = 12.4% = .124
significant at .01 level if D $\geq$ .168
significant at .05 level if D $\geq$ .140

TABLE 3 (CONT.)

WHITES

HRLYPAY	Non-Veterans	Veterans	D.F.	F.	P.
Mean	$6.20	$6.09	1	.64	.43
Std. Dev.	2.61	2.37	1796		
N	1362	436			

HOURPAY	Non-Veterans	Veterans	Row Total
$0.00 to $2.99	88 6.4	13 3.0	90 5.0
$3.00 to $3.99	165 12.1	56 12.8	221 12.3
$4.00 to $4.99	211 15.5	82 18.8	293 16.3
$5.00 to $5.99	236 17.3	80 18.3	316 17.6
$6.00 to $6.99	214 15.7	79 18.1	293 16.3
$7.00 to $7.99	168 12.3	55 12.6	223 12.4
$8.00 to $8.99	111 8.1	31 7.1	142 7.9
$9.00 to $9.99	58 4.3	14 3.2	72 4.0
GE $10.00	111 8.1	26 6.0	137 7.6
Column Total	1362 75.8	436 24.2	1798 100.0

$\chi^2(8) = 14.31$ significance = .07*

Kolmogorov-Smirnov Test: D = 4.3% = .043
significant at .01 level if D $\geq$ .089
significant at .05 level if D $\geq$ .075

Thus, from Table 3, for hourly pay rate, black non-veterans had a mean hourly wage of $4.40 and a standard deviation of $1.87. [Both calculations were derived from a sample size of 448.] Black veterans, on the other hand, had a mean hourly pay rate of $4.77 with a standard deviation of $1.82 from a sample size of 119. The degrees of freedom (D.F.) of 1 and 565, for the test of difference of means between black veterans and non-veterans, are also given in Table 3. The "F" test value was 3.67 which resulted in a type I error probability value (P) of .06. At this probability value, we would accept at the .05 level of significance the null hypothesis that there is no difference in hourly rate of pay between black veterans and black non-veterans.

The crosstabulation format is presented so that the reader can gain an appreciation as to the distribution of the variable for veterans and non-veterans. The top figure in each cell is the actual number that belongs to that category, while the lower number in each cell give the column percent for that cell. For blacks, the first non-veteran cell shows 106 members who represent 23.6 percent of the column sample size of 448. At the bottom of the crosstabs table is the Chi-Square statistic of 10.44. At five degrees of freedom, this resulted in a .06 significance level. Following the Chi-Square test are the results of the Kolmogorov-Smirnov test. The value of the Kolmogorov-Smirnov test at both .01 level (.168) and .05 level (.140) are shown. Also given is the

absolute maximum difference, "D" (.124) that occurred between any two categories. To be significant at the .01 level, "D" would have had to be equal to or greater than .168.

After the blacks, the data for the whites follow the same format. Shown is the difference of means test, the crosstabs table with the Chi-Squared statistic, and finally, the result of the Kolmogorov-Smirnov test. This format is standardized for all continuous variables in this chapter.

All statistical tests for whites on the data proved to be insignificant. This would indicate that the comparative hourly earnings between white veterans and non-veterans are very similar, and no cohort displayed any advantage.

2. Annual Income

Y(income): This continuous variable measured sampled members total income received from wages, salaries, commissions, tips and gratitudes, and bonuses during 1976. Census regulation confidentially rules, however, do not allow amounts in excess of $50,000 to be shown. Thus, all values in excess of $50,000 are reported as $50,000. This modification should not substantially influence results because of the small numbers exceeding the $50,000 limit.

INCOME: A categorical grouping of annual income (Y) was necessary to enable crosstabulation depiction. Here annual income earned from wages and salaries was formulated into arbitrary categories. Relevant statistics of these two variables are shown in Table 4.

TABLE 4

ANNUAL INCOME BY VETERAN STATUS BY RACE

BLACKS

Y	Non-Veteran	Veteran	D.F.	F.	P.
Mean	8432	8897	1	.77	.38
Std. Dev.	5083	5696	585		
N	466	121			

INCOME	Non-Veteran	Veteran	Row Total
$0000 to $3999	72 15.5	17 14.1	89 15.2
$4000 to $5999	71 15.2	13 10.7	84 14.3
$6000 to $7999	96 20.6	16 13.2	112 19.1
$8000 to $9999	70 15.0	25 20.7	95 16.2
$10000 to $11999	56 12.0	15 12.4	71 12.1
$12000 to $13999	43 9.2	21 17.4	64 10.9
$14000 to $15999	31 6.7	9 7.4	40 6.8
$16000 to $50000	27 5.7	5 4.1	32 5.5
Column Total	466 79.4	121 20.6	587 100.0

$\chi^2(7) = 12.51$ significance = .08*

Kolmogorov-Smirnov Test: D = 8.2% = .082
significant at .01 level if $D \geq .167$
significant at .05 level if $D \geq .139$

TABLE 4 (CONT.)

WHITES

Y (income)	Non-Veteran	Veteran	D.F.	F.	P.
Mean	12,827	12,007	1	4.59	.02**
Std. Dev.	6,616	5,879	1,842		
N	1,402	447			

INCOME	Non-Veteran	Veteran	Row Total
$0000 to $1999	54 3.9	21 4.8	75 4.1
$2000 to $3999	36 2.6	12 2.7	48 2.6
$4000 to $5999	69 4.9	14 3.2	83 4.5
$6000 to $7999	113 8.1	51 11.5	164 8.9
$8000 to $9999	153 10.9	52 11.8	205 11.1
$10000 to $11999	200 14.3	55 12.4	255 13.8
$12000 to $13999	205 14.6	77 17.4	282 15.3
$14000 to $15999	194 13.8	63 14.3	257 13.9
$16000 to $17999	109 7.8	43 9.7	152 8.2
$18000 to $19999	91 6.5	23 5.2	114 6.2
$20000 to $24999	112 8.0	21 4.8	133 7.2
$25000 to $50000	66 4.7	10 2.3	76 4.1
Column Total	1402 76.0	442 24.0	1844 100.0

$\chi^2(11) = 22.57$ significance = .02**

Kolmogorov-Smirnov Test: D = 6.9% = .069
significant at .01 level if D $\geq$ .089
significant at .05 level if D $\geq$ .074

It can be seen from Table 4 that there was no significant difference for blacks between the average incomes earned by veteran and non-veterans. When grouped into table form, the Chi-Square test showed a significant relationship existed between variables at the .1 level. However the Kolmogorov-Smirnov test, showed no significant difference between the two distributions existed. The significant Chi-Square is obviously due to the large numbers of cells created when the variable was categorized.

For whites, however, all tests except the Kolmogorov-Smirnov test were significant at the .05 level. This result indicates that in respect to average income, white non-veterans, on the average, have higher incomes.

Both hourly rate of pay and total income from wages and salaries are considered by be "key" variables by the NLS Center. Because of their importance and wide use in research studies, these variables have been specifically constructed, assessed, and unrealistic values edited by the NLS Center.

3. Marriage, Health, SMSA, Region and Vocational Training

A number of dichotomous or dummy variables were used during the analysis. All dummy variables were tested only by the Chi-Square statistic. However, all the cells met the requirement to have a greater expected frequency count than 5. Each table is standardized in the same format for each dichotomous variable.

a. Marry

If the respondent indicated he had never married, he was assigned the value zero. All other cases were given

the value one. An examination of Table 5 for blacks, indicates that in cell 1, there were 102 black non-veterans who had never married. This figure is 21.7 percent of all black non-veterans, while in cell 2, the 369 married black non-veterans comprises 78.3 percent of the black non-veteran sample. Row percentages show that of the total sample of black veterans and non-veterans 21.6 had never married while 78.4 were married. The low Chi-Square statistic of .006 at 1 degree of freedom infers that there is no difference in the marriage pattern of black veterans and non-veterans. For whites, however, the Chi-Square value of 4.87 indicates that white veterans are more likely to be married than white non-veterans. The greater propensity of white veterans to be married is possibly in part due to the fact that the average age of white veterans is also significantly higher, than for white non-veterans. This places them in a more marriage eligible group. Black veterans, however, are younger than black non-veterans, but not significantly. Therefore, black veterans and black non-veterans possibly have a similar marriage pattern.

b. Healthy

When respondents indicated that their health did not prevent nor limit their work activities, they were allocated the value one. Positive answers by respondents were assigned the value zero. Table 6, which details the results of the statistical tests on the health status of veterans and non-veterans, shows that there is no significant difference between

TABLE 5

MARRIAGE BY VETERAN STATUS BY RACE

BLACKS

MARRY	Non-Veteran	Veteran	Row Total
Never Married	102	26	128
	21.7	21.3	21.6
Married	369	96	465
	78.3	78.7	78.4
Column Total	471	122	593
	79.4	20.6	100.0

$\chi^2(1) = .006$ significance = .93

WHITES

MARRY	Non-Veteran	Veteran	Row Total
Never Married	248	58	306
	17.6	13.1	16.5
Married	1162	384	1546
	82.4	86.9	83.5
Column Total	1410	442	1852
	76.1	23.9	100.0

$\chi^2(1) = 4.87$ significance = .03**

TABLE 6

HEALTH BY VETERAN STATUS BY RACE

BLACKS

HEALTHY	Non-Veteran	Veteran	Row Total
Good Health	435 92.4	116 95.1	551 92.9
Poor Health	36 7.6	6 4.9	42 7.1
Column Total	471 79.4	122 20.6	593 100.0

$\chi^2(1) = 1.09$ significance = .30

WHITES

HEALTHY	Non-Veteran	Veteran	Row Total
Good Health	1289 91.7	419 94.8	1708 92.4
Poor Health	117 8.3	23 5.2	140 7.6
Column Total	1406 76.01	442 23.9	1848 100.0

$\chi^2(1) = 4.67$ significance = .03**

black veterans and non-veterans. However, white veterans show that they are significantly more healthy, or health limits their work capacity for less than their non-veteran counterparts. One would expect veterans to be healthier since they must pass basic medical and physical tests and are encouraged to partake in physical activities. In addition, service physical and medical tests should not be underestimated. In a recent survey, Borack (1980) found 37 percent of the male population, aged 17 to 24 would not qualify for military service based on medical or physical standards. These figures would indicate that veterans in general should lose less time through illness and possibly be more suited to work in demanding environments.

c. SMSA

There are 288 standard metropolitan statistical areas (SMSA) in the United States of America. In particular, a SMSA consists of either a central city having a population in excess of 50,000 or may be adjacent counties affiliated with a central city economically and socially. Respondents residing in a SMSA in 1976 were allocated the value one with non-SMSA residents given the value zero. Table 7 gives the results of the analysis as to the residential status of veterans and non-veterans. It can be seen from this table that both black and white veterans have statistically significant propensity to reside in SMSA's. If SMSA's offer a greater variety of occupations and are more competitive for labor,

TABLE 7

SMSA BY VETERAN STATUS BY RACE

BLACKS

SMSAD	Non-Veteran	Veteran	Row Total
Non-SMSA	188 39.9	26 24.3	214 36.1
In-SMSA	283 60.1	96 78.7	379 63.9
Column Total	471 79.4	122 20.6	593 100.0

$\chi^2(1) = 14.54$ significance $<< .01$***

WHITES

SMSAD	Non-Veteran	Veteran	Row Total
Non-SMSA	414 29.4	111 25.1	525 28.3
In-SMSA	996 70.6	331 74.9	1327 71.7
Column Total	1410 76.1	442 23.9	1852 100.0

$\chi^2(1) = 2.99$ significance = .08*

then veterans are in a position to earn more than their non-veteran counterparts. It would appear from these results that veterans are either more aware of the greater job opportunities offered by SMSA's, or are drawn to occupations that are situated in SMSA's. Either reason should provide a more favorable wage differential for veterans.

d. REGION

If a respondent was residing in the South in 1976, he was assigned the value one. Other areas of the United States were allocated the value zero. An examination of Table 8 indicates no statistical difference in the residential patterns of veterans and non-veterans with respect to these geographical regions.

e. VOCTRG

This variable related to questions asked of respondents as to whether they had ever undertaken any formal occupational training or educational courses that did not lead towards an academic diploma or degree. It is assumed that members who had undertaken such training were intent on enhancing their job skills, and productivity for improved future earnings. Table 9 indicates that both black and white veterans undertake statistically significantly more vocational training than their non-veteran counterparts. No effort has been made to assess the length of this vocational training. In fact the variable only identifies those members who were either motivated, had the opportunity to do training, or were

TABLE 8

REGION BY VETERAN STATUS BY RACE

BLACKS

REGION	Non-Veteran	Veteran	Row Total
Non-South	118 25.1	39 32.2	157 26.6
South	352 74.9	82 67.8	434 73.4
Column Total	470 79.5	121 20.5	591 100.0

$\chi^2(1) = 2.5$ significance = .11

WHITES

REGION	Non-Veteran	Veteran	Row Total
Non-South	961 68.3	299 67.8	1260 68.1
South	447 31.7	142 32.2	589 31.9
Column Total	1408 76.1	441 23.9	1849 100.0

$\chi^2(1) = .03$ significance = .86

TABLE 9

VOCATIONAL TRAINING BY VETERAN STATUS BY RACE

BLACKS

VOCTRG	Non-Veteran	Veteran	Row Total
No Trg	240	38	278
	51.0	31.1	46.9
Trained	231	84	315
	49.0	68.9	53.1
Column Total	471	122	593
	79.4	20.6	100.0

$\chi^2(1) = 15.27$ significance $<< .01$***

WHITES

VOCTRG	Non-Veteran	Veteran	Row Total
No Trg	444	108	552
	31.5	24.4	29.8
Trained	966	334	1300
	68.5	75.6	70.2
Column Total	1410	442	1852
	76.1	23.9	100.0

$\chi^2(1) = 8.01$ significance $= .01$***

considered "trainable" by their employers. Any respondent who gave a positive answer, at any time, was given the value of one, while all other cases assumed the value of zero.

4. Age in 1976

AGE76: This variable reports the respondent's age in 1976. The range extended from 24 to 34 years of age. Table 10 provides the crosstabulation and descriptive data when age was disaggregated by race and veteran status. The age table for blacks shows that there is no difference in the overall means for black veterans and non-veterans. However, the Kolmogorov-Smirnov test does indicate that the distribution between black veterans and non-veterans is dissimilar. The reason for this variance in results is due to the very low percentage of black veterans in the group of 27 year olds. There would seem no apparent reason why this lower number should occur, other than by chance.

For whites, veterans are statistically significantly older than non-veterans. A possible reason for this difference is offered by the Kolmogorov-Smirnov test which proved significant at the .05 level. The difference "D" indicates a high cumulative percentage of whites at the 28 year old level in the veteran group. A historical perspective, would indicate that the 28 year olds were of prime "draft eligible" age during the Vietnam build-up. It is not surprising therefore that a large percentage of that age cohort are veterans.

TABLE 10

AGE IN 1976 BY VETERAN STATUS BY RACE

BLACKS

AGE76	Non-Veteran	Veteran	D.F.	F.	P.
Mean	28.02	27.66	1	1.37	.24
Std. Dev.	3.20	2.90	591		
N	471	122			

AGE76	Non-Veteran	Veteran	Row Total
24	70	14	84
	14.9	11.5	14.2
25	61	13	74
	13.0	10.7	12.5
26	68	21	89
	14.4	17.2	15.0
27	42	28	70
	8.9	23.0	11.8
28	37	14	51
	7.9	11.5	8.6
29	36	6	42
	7.6	4.9	7.1
30	39	2	41
	8.3	1.6	6.9
31	29	4	33
	6.2	3.3	5.6
32	25	6	31
	5.3	4.9	5.2
33	30	7	37
	6.4	5.7	6.9
34	34	7	41
	7.2	5.7	6.9
Column Total	471	122	593
	79.4	20.6	100.0

$\chi^2(10) = 28.37$ significance = .00***

Kolmogorov-Smirnov Test: D = 14.8% = .148**
significant at .01 level if D $\geq$ .165
significant at .05 level if D $\geq$ .138

TABLE 10 (CONT.)

WHITES

AGE76	Non-Veteran	Veteran	D.F.	F.	P.
Mean	28.2	28.55	1	3.92	.05**
Std. Dev.	3.2	3.08	1850		

AGE76	Non-Veteran	Veteran	Row Total
24	200	36	236
	14.2	8.1	12.7
25	173	47	220
	12.3	10.6	11.9
26	164	54	218
	11.6	12.2	11.8
27	151	50	201
	10.7	11.3	10.9
28	128	65	193
	9.1	14.7	10.4
29	114	37	151
	8.1	8.4	8.2
30	91	20	111
	6.5	4.5	6.0
31	74	27	101
	5.2	6.1	5.5
32	111	39	150
	7.9	8.8	8.1
33	103	31	134
	7.3	7.0	7.2
34	101	36	137
	7.2	8.1	7.4
Column Total	1410	442	1852
	76.1	23.9	100.0

$\chi^2(10) = 24.26$ significance = .01***

Kolmogorov-Smirnov Test: D = 7.8% = .078**
significant at .01 level if D $\geq$ .089
significant at .05 level if D $\geq$ .074

5. Education

HGHSTED: The respondent's highest attained grade of education is given by the variable HGHSTED. Because education is a key determinant of future income and earning power, two categorical derivations of education were also constructed.

1. SCHOOL: This variable has six groups and highlights those who attained high school diplomas and college degrees.

2. EDUC: This variable is categorized into three levels; elementary, high school, and college attendance.

For blacks, it was found that veterans were statistically significantly better educated than non-veterans. An examination of the categorical variable SCHOOL indicates that the lower levels of education statistically vary from the higher levels when tested by the Kolmogorov-Smirnov technique. This is not surprising, as it confirms service recruitment policy. From Table 11 it can be seen that the military has recruited very few elementary or only high school educated blacks. The majority of the blacks recruited are high school graduates or those with some college. The reason for this recruitment policy is because education level is used as a prime criterion indicating whether recruits will complete their enlistment period. Lockman (1976) showed that non-high school graduates have the highest propensity to attrite, regardless of mental group category.

For whites, it was found that non-veterans had a statistically significantly higher level of education. In addition, a close examination of the categorized educational

TABLE 11

EDUCATION BY VETERAN STATUS BY RACE

BLACKS

HGHSTED	Non-Veteran	Veteran	D.F.	F.	P.
Mean	11.39	12.48	1	12.23	.01***
Std. Dev.	2.96	1.90	545		
N	499	98			

SCHOOL	Non-Veteran	Veteran	Row Total
Elementary	73	2	75
	16.3	2.0	13.7
High School	124	12	136
	27.6	12.2	24.9
High School Graduate	145	46	191
	32.3	46.9	34.9
Some College	54	30	84
	12.0	30.6	15.4
College Graduate	32	6	38
	7.1	6.1	6.9
Higher College	21	2	23
	4.7	2.0	4.2
Column Total	449	98	547
	82.1	17.9	100.0

$\chi^2(5) = 43.99$, significance $<<$ .01***

Kolmogorov-Smirnov Test: D = 29.4% = .294***
significant at .01 level if D $\geq$ .182

EDUC	Non-Veteran	Veteran	Row Total
Elementary	73	2	75
	16.3	2.0	13.7
High School	269	58	327
	59.9	59.2	59/8
College	107	38	145
	23.8	38.8	26.5
Column Total	449	98	547
	82.1	17.9	100.0

$\chi^2(2) = 18.64$, significance $<<$ .01

TABLE 11 (CONT.)

WHITES

HGHSTED	Non-Veteran	Veteran	D.F.	F.	P.
Mean	13.60	13.17	1	7.78	.01***
Std. Dev.	2.83	2.00	1706		
N	1321	387			

SCHOOL	Non-Veteran	Veteran	Row Total
Elementary	57	3	60
	4.3	0.8	3.5
High School	146	25	171
	11.1	6.5	10.0
High School Graduate	409	187	596
	31.0	48.3	34.9
Some College	242	101	343
	18.3	26.1	20.1
College Graduate	273	45	318
	20.7	11.6	18.6
Higher College	194	26	220
	14.7	6.7	12.9
Column Total	1321	387	1708
	77.3	22.7	100.0

$\chi^2(5) = 79.73$, significance $<<$ .01***

Kolmogorov-Smirnov Test: D = 27.0% = .270***
significant at .01 level if D $\geq$ .094

EDUC	Non-Veteran	Veteran	Row Total
Elementary	57	3	60
	4.3	0.8	3.5
High School	555	212	767
	42.0	54.8	44.9
College	709	172	881
	53.7	44.4	516.
Column Total	1321	387	1708
	77.3	22.7	100.0

$\chi^2(2) = 26.48$, significance $<<$ .01***

variables again confirms military service recruitment policy. Most of the military recruits belong to the high school graduate and some college groups. The high percentage of non-veterans that complete college or higher, is sufficient to compensate for the poorly educated non-veterans and results in the non-veterans education level being statistically significantly higher than white veterans. These results are found in Table 11.

6. Tenure

TENURE: This is the variable used to describe the actual number of years the respondent had been working for his current employer. However, the member may not necessarily be in the same job in which he started, due to promotion or training.

JOBYEAR: As the range of tenure extended from one to twenty-three years for blacks, and from one to nineteen years for whites, it was considered convenient to group the few who had more than eleven years tenure. This produced a categorical variable JOBYEAR. Statistics related to these variables are given in Table 12. It can be seen from Table 12 that for both blacks, and whites, non-veterans have statistically significantly higher mean tenure than veterans. The Kilmogorov-Smirnov test also infers that the two groups differend in their distributions. It would appear that veterans have a far greater positive skewness to their distribution than non-veterans. The obvious reason for this positive skewness is that military service has detracted from veterans

TABLE 12

TENURE BY VETERAN STATUS BY RACE

BLACKS

TENURE	Non-Veteran	Veteran	D.F.	F.	P.
Mean	5.37	3.58	1	23.09	<<.01***
Std. Dev.	3.85	2.86	591		
N	471	122			

JOBYEARS	Non-Veteran	Veteran	Row Total
1	86	39	125
	18.7	32.8	21.6
2	45	14	59
	9.8	11.8	10.2
3	48	19	67
	10.5	16.0	11.6
4	52	19	71
	11.3	16.0	12.3
5	45	7	52
	9.8	5.9	9.0
6	32	6	38
	7.0	5.0	6.6
7	21	1	22
	4.6	0.8	4.2
8	37	5	42
	8.1	4.2	7.3
9	23	1	24
	5.0	0.8	4.2
10	23	2	25
	5.0	1.7	4.3
11+	47	6	53
	10.2	5.0	9.2
Column Total	459	119	578
	79.4	20.6	100.0

$\chi^2(10) = 29.81$, significance << .01***

Kolmogorov-Smirnov Test: D = 26.6% = .266***
Significant at .01 level if $D \geq .167$

TABLE 12 (CONT.)

WHITES

TENURE	Non-Veteran	Veteran	D.F.	F.	P.
Mean	5.45	4.47	1	22.20	<<.01***
Std. Dev.	3.93	3.31	1846		
N	1407	441			

JOBYEARS	Non-Veteran	Veteran	Row Total
1	253 18.6	100 23.4	353 19.7
2	141 10.4	58 13.6	199 11.1
3	174 12.8	47 11.0	221 12.4
4	133 9.8	60 14.1	193 10.8
5	125 9.2	43 10.1	168 9.4
6	100 7.3	33 7.7	133 7.4
7	25 1.8	5 1.2	30 1.7
8	91 6.7	17 4.0	108 6.0
9	82 6.0	14 3.3	96 5.4
10	57 4.2	10 2.3	67 3.7
11+	180 13.2	40 9.4	220 12.3
Column Total	1361 76.1	427 23.9	1788 100.0

$\chi^2(10) = 29.80$, significance $<< .01$***

Kolmogorov-Smirnov Test: D = 4.8% = .080**
Significant at .01 level if D $\geq$ .090
Significant at .05 level if D $\geq$ .075

the opportunity to gain years of service with the same employer. It can be seen from the table that for black veterans 32.8 percent have one year tenure, but only 5 percent have 11 or more years tenure. Black non-veterans, however, have only 18.7 percent with one year tenure, but approximately 10 percent of their group has 11 years or more of tenure. Similarly, white veterans are also effected having smaller group percentages with high tenure and a large group percentage with a low tenure than do the non-veterans. For example, 23 percent of white veterans have one year or less tenure compared to only 18 percent of the white non-veteran group with one year or less tenure.

7. Weeks of Employment

WKSEMP: The WKSEMP variable counts the number of weeks of full employment undertaken by respondents in 1976. To enable crosstabulation it was necessary to derive a grouped variable named WORK.

WORK: This variable grouped the number of weeks employed into seven categories that attempted to differentiate between high levels of employment, but grouped low levels of employment. The results of these variables are given in Table 13.

Of all the tests conducted, only the oneway analysis of variance for blacks on the continuous variable WKSEMP was statistically significant. The results show that, on the average, non-veterans had more weeks of employment than

TABLE 13

WEEKS OF EMPLOYMENT 1976 BY VETERAN STATUS BY RACE

BLACKS

WKSEMP	Non-Veteran	Veteran	D.F.	F.	P.
Mean	48.13	45.73	1	4.38	.04*
Std. Dev.	10.26	13.58	556		
N	441	117			

WORK	Non-Veteran	Veteran	Row Total
01-12 weeks	11 2.5	7 6.0	18 3.2
13-25 weeks	15 3.4	5 4.3	20 3.6
26-38 weeks	21 4.8	8 6.8	29 5.2
39-44 weeks	25 5.7	8 6.8	33 5.9
45-48 weeks	46 10.4	11 9.4	57 10.2
49-51 weeks	104 23.6	29 24.8	133 23.8
52 weeks	219 49.7	49 41.9	268 48.0
Column Total	441 79.0	117 21.0	558 100.0

$\chi^2(6) = 6.98$, significance = .42

Kolmogorov-Smirnov Test: D = 7.7% = .077
significant at .01 level if D $\geq$ .169
significant at .05 level if D $\geq$ .141

TABLE 13 (CONT.)

WHITES

WKSEMP	Non-Veteran	Veteran	D.F.	F.	P.
Mean	49.73	49.43	1	.44	.5
Std. Dev.	7.89	8.00	1752		
N	1336	418			

WORK	Non-Veteran	Veteran	Row Total
01-12 weeks	17 1.3	2 0.5	19 1.1
13-25 weeks	25 1.9	11 2.6	36 2.1
26-38 weeks	41 3.1	23 5.5	64 3.6
39-44 weeks	54 4.0	18 4.3	72 4.1
45-48 weeks	142 10.6	38 9.1	180 10.3
49-51 weeks	363 27.2	105 25.1	468 26.7
52 weeks	694 51.9	221 52.9	915 52.2
Column Total	1336 76.2	418 23.8	1754 100.0

$\chi^2(6) = 9.26$, significance = .16

Kolmogorov-Smirnov Test: D = 2.6% = .026
Significant at .01 level if $D \geq .091$
Significant at .05 level if $D \geq .076$

did veterans. Despite this fact, black non-veterans did not average a higher income, as determined in Table 4. This result is possibly due in part to the higher hourly rate by black veterans, as shown in Table 3. Other reasons for the statistically significant lower number of weeks of employment by black veterans is that they may encounter greater difficulties during the transition period from military employment to civilian employment than do white veterans. This finding would tend to be supported by the high re-enlistment rate of blacks in the Army [Moskos, 1979]. For blacks, security of employment, and the equal opportunity environment of the military, may be far better than that available in the civilian sector.

8. Mental Ability

IQ: Mental aptitude, as measured by the standard intelligence quotient score is given by the variable IQ. The IQ variable in NLS data has been derived from numerous tests and at times includes rescaled grade point averages, Kohen (1976). Thus, interpretations made from this variable are suspect and should be viewed with caution. For the cross-tabulation presentation, the standard format as derived by the NLS Center was used for each sample.

IQSTIN: This variable gives IQ scores grouped by population percentages into nine categories to produce a bell-shaped curve. Table 14 gives the results of the oneway analysis of variance and the other two statistical tests.

TABLE 14

MENTAL ABILITY BY VETERAN STATUS BY RACE

BLACKS

IQ	Non-Veteran	Veteran	D.F.	F.	P.
Mean	86.17	90.46	1	3.76	.06*
Std. Dev.	15.30	14.51	235		
N	174	63			

IQSTIN	Non-Veteran	Veteran	Row Total
Lowest 4%	35 20.1	7 11.1	42 17.7
Next 7%	31 17.8	7 11.1	38 16.0
Next 12%	30 17.2	9 14.3	39 16.5
Next 17%	25 14.4	13 20.6	38 16.0
Middle 20%	33 19.0	16 25.4	49 20.7
Next 17%	14 8.0	7 11.1	21 8.9
Next 12%	6 3.4	4 6.3	8 3.4
Column Total	174 73.4	63 26.6	237 100.0

$\chi^2(6) = 7.1$, significance = .31

Kolmogorov-Smirnov Test: D = 18.6% = .186
significant at .01 level if $D \geq .240$
significant at .05 level if $D \geq .200$

TABLE 14 (CONT.)

WHITES

IQ	Non-Veteran	Veteran	D.F.	F.	P.
Mean	105.85	103.25	1	9.49	<<.01***
Std. Dev.	14.10	13.07	1406		
N	1046	362			

IQSTIN	Non-Veteran	Veteran	Row Total
Lowest 4%	15 1.4	5 1.4	20 1.4
Next 7%	27 2.6	2 0.6	29 2.1
Next 12%	60 5.7	34 9.4	94 6.7
Next 17%	122 11.7	59 16.3	181 12.8
Middle 20%	247 23.6	104 28.7	351 24.9
Next 17%	236 22.5	73 20.2	309 21.9
Next 12%	191 18.2	48 13.3	239 17.0
Next 7%	102 9.7	27 7.5	129 9.2
Top 4%	47 4.5	10 2.8	57 4.0
Column Total	1047 74.3	362 25.7	1409 100.0

$\chi^2(8) = 26.30$, significance << .01***

Kolmogorov-Smirnov Test: D = 11.4% = .114***
Significant at .01 level if D $\geq$ .100

Taking the IQ values as given, it was found that both the Chi-Square and Kolmogorov-Smirnov tests showed the given distribution for veterans and non-veterans to be statistically significantly different for whites but not for blacks for the grouped data. However, the difference in means between veterans and non-veterans for both blacks and whites was statistically significant. For blacks, on average, veterans were four points superior to black non-veterans. The reverse, however, held true for whites, with non-veterans being approximately 2.5 points superior to white veterans, on average.

9. Socio-Economic Status

SES: This is a socio-economic variable that has been constructed by the NLS Center to incorporate the various influences of the respondent's home environment. In particular, the socio-economic status (SES) index is comprised of the following five indicators:

1. Father's occupation.
2. Father's education level/highest grade.
3. Mother's education level/highest grade.
4. Education of the oldest, older sibling.
5. Availability of reading material in the home.

The variable has been constructed to have a grand mean of 10.0 and a standard deviation of 3.0. A high index number would indicate a favorable home environment in which the individual would possibly have greater opportunity, and encouragement to develop his talents. The range of the SES variable for the sample was 2.1 to 15.8.

SESG: A derivation of the socio-economic status variable SES was necessary. SESG grouped SES into categories to present the crosstabulation format shown in Table 15.

An examination of Table 15 shows that for blacks, the veterans come from backgrounds that have a statistically significantly higher socio-economic index than for the black non-veterans. However, for whites the reverse is true, with veterans coming from statistically significantly less privileged homes. The Kolmogorov-Smirnov test shows that the two sample distributions do not differ. However, this is possibly due to the effects of too few categories. Categories were arbitrarily set to maintain cells with expected frequency counts of greater than 5. The significance of these results is that it confirms [Reaghard, 1980] studies in which he found the military was not representative of society. Reaghard indicated, as these results do, that the military had the better privileged blacks, but the less privileged whites.

10. Hours Worked Per Week

CJOBHRS: This is a variable which gives the average number of hours worked in a week by individuals in the sample as reported in the 1976 survey. The range for full employment began at 35, and extended as high as 105.

HOURS: To enable crosstabulation of the data a constructed variable, HOURS, was formulated by arbitrarily assigning eight categories. While it was thought appropriate to use a regular five hour interval for the first seven

TABLE 15

SOCIO-ECONOMIC STATUS BY VETERAN STATUS BY RACE

BLACKS

SES	Non-Veteran	Veteran	D.F.	F.	P.
Mean	8.03	8.68	1	7.9	<<.01***
Std. Dev.	2.21	1.96	518		
N	410	110			

SESG	Non-Veteran	Veteran	Row Total
0.0 - 5.9	71 17.3	9 8.2	80 15.4
6.0 - 8.9	193 47.1	51 46.4	244 46.9
9.0 - 9.9	69 16.8	18 16.4	87 16.7
10.0 - 10.9	34 8.3	19 17.3	53 10.2
11.0 - 11.9	29 7.1	8 7.3	37 7.1
12.0 - 17.5	14 3.4	5 4.5	19 3.6
Column Total	410 78.8	110 21.2	520 100.0

$\chi^2(6) = 13.47$, significance = .03**

Kolmogorov-Smirnov Test: D = 10.2% = .102
Significant at .01 level if $D \geq .175$
Significant at .05 level if $D \geq .145$

TABLE 15 (CONT.)

WHITES

SES	Non-Veteran	Veteran	D.F.	F.	P.
Mean	10.65	10.47	1	2.67	.10*
Std. Dev.	2.06	1.79	1787		
N					

SESG	Non-Veteran	Veteran	Row Total
0.0 - 5.9	37 2.7	5 1.2	42 2.4
6.0 - 8.9	202 14.9	75 17.5	277 15.5
9.0 - 9.9	206 15.2	73 17.0	279 15.6
10.0 - 10.9	291 21.5	99 23.1	390 21.9
11.0 - 11.9	274 20.2	93 21.7	367 20.6
12.0 - 12.9	200 14.8	53 12.4	253 14.2
13.0 - 17.5	145 10.7	31 7.2	176 9.9
Column Total	1355 76.0	429 24.0	1784 100.0

$\chi^2(6) = 11.50$, significance = .07*

Kolmogorov-Smirnov Test: D = 5.8% = .058
significant at .01 level if D $\geq$ .090
significant at .05 level if D $\geq$ .075

categories, the low numbers above sixty hours per week made it convenient to group these together.

No statistical test proved significant in the black sample for difference between veterans and non-veterans. However, it was found that for whites all tests were statistically significant. Non-veterans worked, on the average, approximately one hour more per week than their veteran counterpart. These figures were significantly different at the .05 level, and are reported in Table 16.

D. EARNING FACTORS SUMMARY

Table 17 summarizes the variables and their levels of significance in the oneway analysis of variance, Kolmogorov-Smirnov and Chi-Square tests. Due to the arbitrary grouping of variables and the large sample size, the value of the Chi-Square for other than the dichotomous variables is to be accepted with caution. A closer examination of data distributions is generally well advised as individual judgment is required to evaluate better the data. The Kolmogorov-Smirnov test should assist this judgment by indicating if the veteran and non-veteran distribution for that factor differed radically in distribution. This is particularly important, where data are grouped for convenience into categories with no basic rationale. Most categories were assigned on the basis of ease of presentation and the aim of keeping expected cell counts greater than 5, or 80 percent of the table with

TABLE 16

HOURS WORKED PER WEEK BY VETERAN STATUS BY RACE

BLACKS

CJOBHRS	Non-Veteran	Veteran	D.F.	F.	P.
Mean	42.99	42.20	1	1.23	.26
Std. Dev.	7.29	6.23	591		
N	471	122			

HOURS	Non-Veteran	Veteran	Row Total
35-39 hours	23 5.0	6 5.0	29 5.0
40-44 hours	325 71.3	90 75.0	415 72.0
45-49 hours	61 13.4	15 12.5	76 13.2
50-54 hours	33 7.2	6 5.0	39 6.8
55-59 hours	5 1.1	2 1.7	7 1.2
60-105 hours	9 2.0	1 0.8	10 1.7
Column Total	456 79.2	120 20.8	576 100.0

$\chi^2(9) = 12.47$, significance = .18

Kolmogorov-Smirnov Test: D = 3.7% = .037
Significant at level .01 if D $\geq$ .167
Significant at level .05 if D $\geq$ .140

TABLE 16 (CONT.)

WHITES

CJOBHRS	Non-Veteran	Veteran	D.F.	F.	P.
Mean	44.83	43.74	1		
Std. Dev.	8.61	7.38	1852	5.76	.02**
N	1410	447			

HOURS	Non-Veteran	Veteran	Row Total
35-39 hours	92 6.8	23 5.4	115 6.5
40-44 hours	767 57.1	288 68.1	1055 59.7
45-49 hours	207 15.4	50 11.8	257 14.7
50-54 hours	169 12.6	36 8.5	205 11.6
55-59 hours	64 4.8	16 3.8	80 4.5
60-105 hours	45 3.3	10 2.4	55 3.1
Column Total	1344 76.1	423 23.9	1767 100.0

$\chi^2(9) = 16.62$, significance = .01***

Kolmogorov-Smirnov Test: D = 9.6% = .096***
significant at .01 level if D $\geq$ .090

TABLE 17

SUMMARY OF VARIABLES AND TEST RESULTS

TABLE NUMBER	VARIABLE NAME	DESCRIPTION OF VARIABLE	BLACKS Non-Vets	BLACKS Vets	WHITES Non-Vets	WHITES Vets
2	VETERAN	Dummy: Non-Veteran = 0; Veteran =1				
3	HRLYPAY	Hourly pay rate		*		
3	HOURPAY	Hourly pay rate in categories		•	•	
4	Y(INCOME)	Total wages and salaries earned			**	
4	INCOME	Total wages & salaries in categories		•	••	
5	MARRY	Dummy: Never Married=0; Married=1				••
6	HEALTHY	Dummy: Not healthy =0; healthy = 1				••
7	SMSA	Dummy: Non SMSA =0; In SMSA=1		•••		•
8	REGION	Dummy: Non South =0; in South=1				
9	VOCTRG	Dummy: No Voctrg =0; Voctrg=1		•••		•••
10	AGE76	Age in 1976	•• oo			** ••• oo
11	HGHSTED	Highest grade of schooling		***	***	
11	SCHOOL	Highest grade in 6 categories		••• ooo	••• ooo	
11	EDUC	Highest grade in 3 categories		•••	•••	
12	TENURE	Years with same employer	***		***	
12	JOBYEARS	Tenure in categories	••• ooo		oo	
13	WKSEMP	Weeks employed	**			
13	WORK	Weeks employed in categories				
14	IQ	IQ score		*	*	
14	IQSTIN	IQ in Stanine categories			•••	

TABLE 17 (CONT.)

TABLE NUMBER	VARIABLE NAME	DESCRIPTION OF VARIABLE	BLACKS		WHITES	
			Non-Vets	Vets	Non-Vets	Vets
15	SES	Socio-economic status		***	*	
15	SESG	SES in categories		••	•	
16	CJOBHRS	Number of hours worked per week			**	
16	HOURS	CJOBHRS in categories			***	

* F TEST • Chi-Square Test o Kolmogorov-Smirnov Test

*** significant at .01 level and favors higher income and earnings

** significant at .05 level and favors higher income and earnings

* significant at .10 level and favors higher income and earnings

cells having expected frequencies greater than 5. This rationale enables some value to be placed in the Chi-Square statistic.

1. Blacks

An examination of Table 17 indicates that the veteran and non-veteran samples for both black and white have many significant dissimilarities. It would appear that for blacks, non-veterans have an advantage over black veterans in only greater tenure and weeks of employment. Black veterans, however, despite that disadvantage, command a significantly higher rate of pay per hour, and higher annual income from wages and salaries than black non-veterans. Other significant advantages that black veterans possess over black non-veterans, are higher levels of education, intelligence, and socio-economic family backgrounds. They also undertake more vocational training, and tend to reside in less rural areas. From this analysis, it could be inferred that the black veteran sample is generally superior to the black non-veteran group in most factors that contribute to employability, and income generation. The only two factors on which black non-veterans were superior to black veterans was in tenure, and weeks of employment. This non-veteran superiority in tenure, and weeks of employment, is one that should be expected. Loss of tenure, and employment, by veterans, would be a natural result of their military service, and the transition employment period into the civilian sector.

2. Whites

For whites, the data would indicate that white non-veterans have employment advantages over veterans with regard to education, intelligence, tenure, and family socio-economic status. White veterans, however, are favorably situated with regard to marriage, health, vocational training, and age. Moreover, white veterans tend to reside more often in SMSA areas helping them have greater access to employment opportunities.

The most common, and usually the ultimate measure of employability, is the "price" employers are willing to pay. Accepting this as an appropriate objective measure, results indicate white non-veterans earn significantly higher incomes than do white veterans.

E. CONSTRUCTED EARNINGS PROFILES

Unfortunately, the limitations of these results are that the data are cross-sectional. This means we are taking a "snap shot" of respondents as to their earnings, and earning attributes as reported in the 1976 survey. These data limitations do not make it possible to determine disadvantages or benefits accruing to individuals as a result of their military service over time. In fact, this would only be possible if the analysis had been conducted longitudinally.

In an attempt to rectify this deficiency and give some possible indication of longitudinal benefits, hourly wage

rate, and annual income have been disaggregated by age and plotted graphically. For this graphical presentation to represent a segment of life-cycle benefits, it is necessary to make two assumptions:

1. The distribution of earning factors between large groups is not affected by time or is proportionately time affected. To further clarify this point it is assumed that attributes like IQ do not change distribution in a large group regardless of age. While tenure, additional education, and training, health, marriage, incomes, etc., are time affected, but in a proportionate sense. For example, this implies that the distribution of attributes of the current 28 year olds in the population will be the same as the current 32 year olds, in four years time. Similarly the current 28 year olds had an identical distribution of earnings attributes as possessed by the current 24 year olds four years previously.

2. Economic factors like inflation, recession or industrial disputes, are held constant.

It is appreciated that the first assumption is a tenuous assumption for the veteran group. In particular, not only have veterans been selected because they met some basic selection criteria, but historical circumstances have possibly varied these selection standards. Historically, this era saw the draft, draft avoidance, lottery selection, and voluntary recruitment. These factors possibly bias those in the veteran group in relationship to the most influential or prevalent factor present at the time of enlistment.

There is no way of controlling for the second assumption except by using the term "ceteris paribus". However, despite these limitations the constructed earnings profiles may give us some insight into the time dependent nature of any veterans earnings premium. Using the criteria as given, Figure 5 and Figure 6 have been produced from the information given in Tables 18 and 19. Figure 5 gives hourly pay rate by age (time), while Figure 6 gives annual income by age (time). Due to the low number of black veterans in many age groups it was considered inappropriate to produce that curve.

It can be seen from Figure 5, hourly wage rate by age, that white non-veterans demand a higher hourly pay rate than veterans in eight of the eleven reported age groups. Similarly in Figure 6, income obtained by non-veterans is consistently higher for all age groups except for the 32 year olds. For black non-veterans, the curves show a remarkable consistency of no increase over age. These graphs raise many interesting questions as to the qualities and reasons that contribute to the apparent disparity in wages between veterans and non-veterans, blacks and whites. However, the interaction between factors to give these financial differentials is complicated and more statistically sophisticated techniques are required to identify which factors contribute to income, and the extent of their contribution. This type of analysis is beyond the powers of the descriptive statistics produced in this chapter. In the next chapter multivariate analysis is

TABLE 18

HOURLY RATE OF PAY BY VETERAN STATUS BY RACE BY AGE

BLACK VETERANS

AGE GROUP	COUNT	MEAN	STANDARD DEVIATION
		$0.00	$0.00
24	14	3.65	1.21
25	13	4.89	1.98
26	21	4.58	1.57
27	27	4.85	1.29
28	41	4.91	2.09
29	6	4.81	1.61
30	2	6.13	1.32
31	3	5.95	2.08
32	6	6.49	3.98
33	7	4.88	0.37
34	6	4.17	2.17
TOTAL	119	4.77	1.82

BLACK NON-VETERANS

AGE GROUP	COUNT	MEAN	STANDARD DEVIATION
		$0.00	$0.00
24	63	4.41	1.58
25	60	4.22	1.74
26	66	4.27	1.73
27	39	3.94	1.66
28	32	4.87	1.90
29	36	4.27	1.64
30	38	4.40	1.91
31	29	4.02	2.06
32	24	4.72	1.90
33	28	4.60	1.86
34	33	5.19	2.82
TOTAL	448	4.40	1.87

WHITE VETERANS

AGE GROUP	COUNT	MEAN	STANDARD DEVIATION
		$0.00	$0.00
24	36	4.56	1.75
25	47	5.42	1.79
26	54	5.05	1.51
27	50	5.93	2.33
28	65	5.60	1.57
29	34	6.69	2.53
30	20	6.27	1.80
31	27	7.38	2.94
32	39	7.05	2.97
33	29	8.31	3.24
34	35	6.68	1.63
TOTAL	436	6.09	2.37

WHITE NON-VETERANS

AGE GROUP	COUNT	MEAN	STANDARD DEVIATION
		$0.00	$0.00
24	191	4.94	2.05
25	167	5.96	2.17
26	160	5.28	1.89
27	145	5.96	2.21
28	123	6.57	2.62
29	112	6.58	2.64
30	89	6.58	2.56
31	74	6.68	3.02
32	110	7.43	2.76
33	93	7.26	2.73
34	98	7.41	3.34
TOTAL	1362	6.20	2.61

TABLE 19

ANNUAL INCOME BY VETERAN STATUS BY RACE BY AGE

BLACK VETERANS

AGE GROUP	COUNT	MEAN	STANDARD DEVIATION
24	14	$6500	$4287
25	13	7653	3809
26	21	7359	4459
27	28	11537	8399
28	14	10238	3686
29	6	7816	5378
30	2	10250	2474
31	4	9000	7348
32	6	8766	5380
33	7	9545	1376
34	6	7066	5057
TOTAL	121	8897	5696

BLACK NON-VETERANS

AGE GROUP	COUNT	MEAN	STANDARD DEVIATION
24	70	$8187	$6623
25	61	7919	4667
26	66	7972	3542
27	40	8016	3993
28	36	7926	5146
29	36	7746	3548
30	39	8522	4114
31	29	8467	6357
32	25	9950	4953
33	30	9137	4758
34	34	10713	6827
TOTAL	466	8432	5083

WHITE VETERANS

AGE GROUP	COUNT	MEAN	STANDARD DEVIATION
24	36	$8112	$4472
25	47	9966	4316
26	54	9258	3646
27	50	11343	4897
28	65	11644	4579
29	37	12741	6847
30	20	13703	3784
31	27	15385	5900
32	39	14341	6348
33	31	16134	9539
34	36	13959	5065
TOTAL	442	12007	5880

WHITE NON-VETERANS

AGE GROUP	COUNT	MEAN	STANDARD DEVIATION
24	198	$9770	$5179
25	173	11119	4837
26	164	10831	4789
27	151	12057	5231
28	128	14181	7647
29	113	13330	6310
30	90	14078	6762
31	74	14233	6872
32	110	16272	6853
33	101	16165	8944
34	100	14644	7281
TOTAL	1402	12827	6616

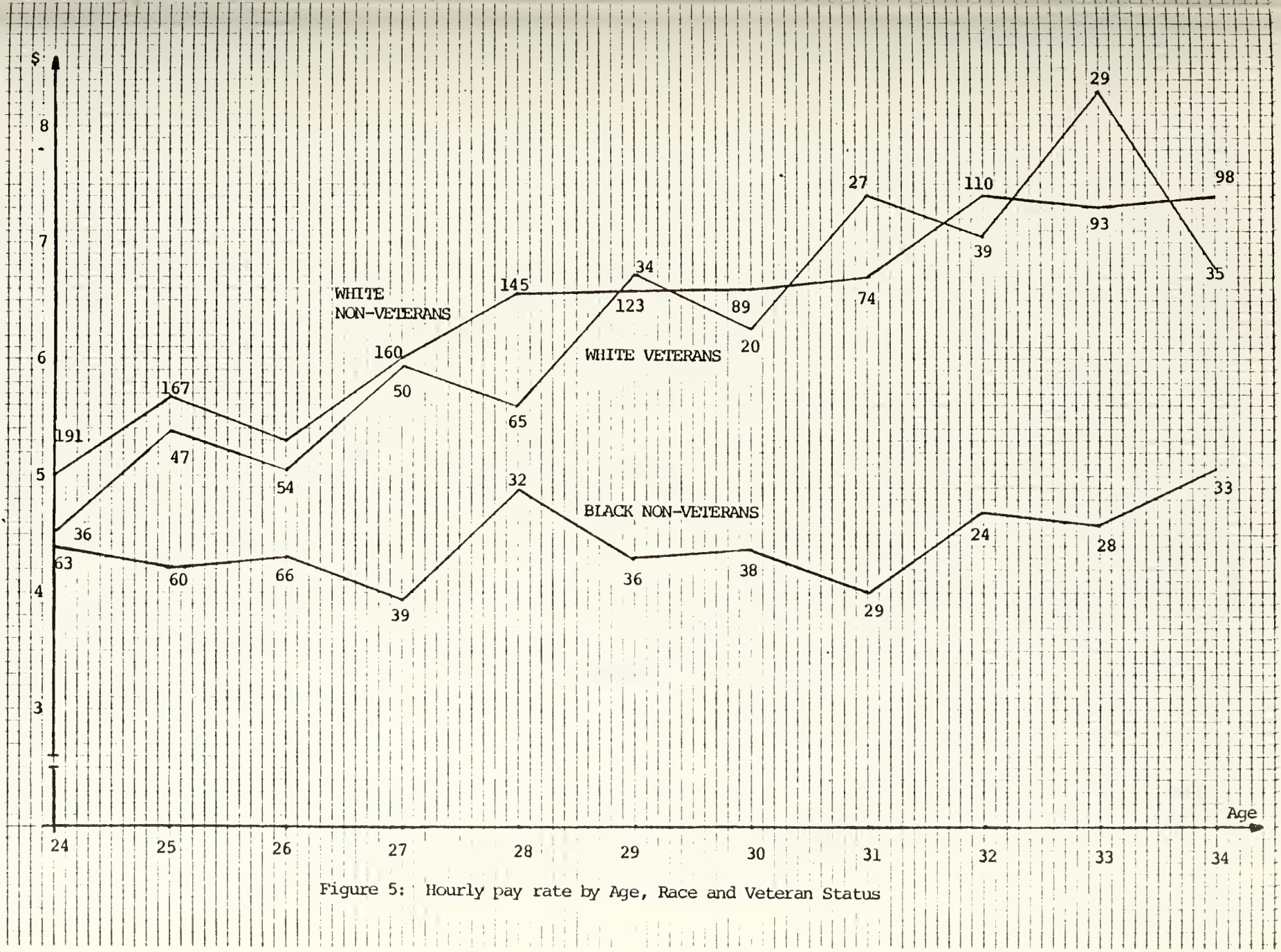


Figure 5: Hourly pay rate by Age, Race and Veteran Status

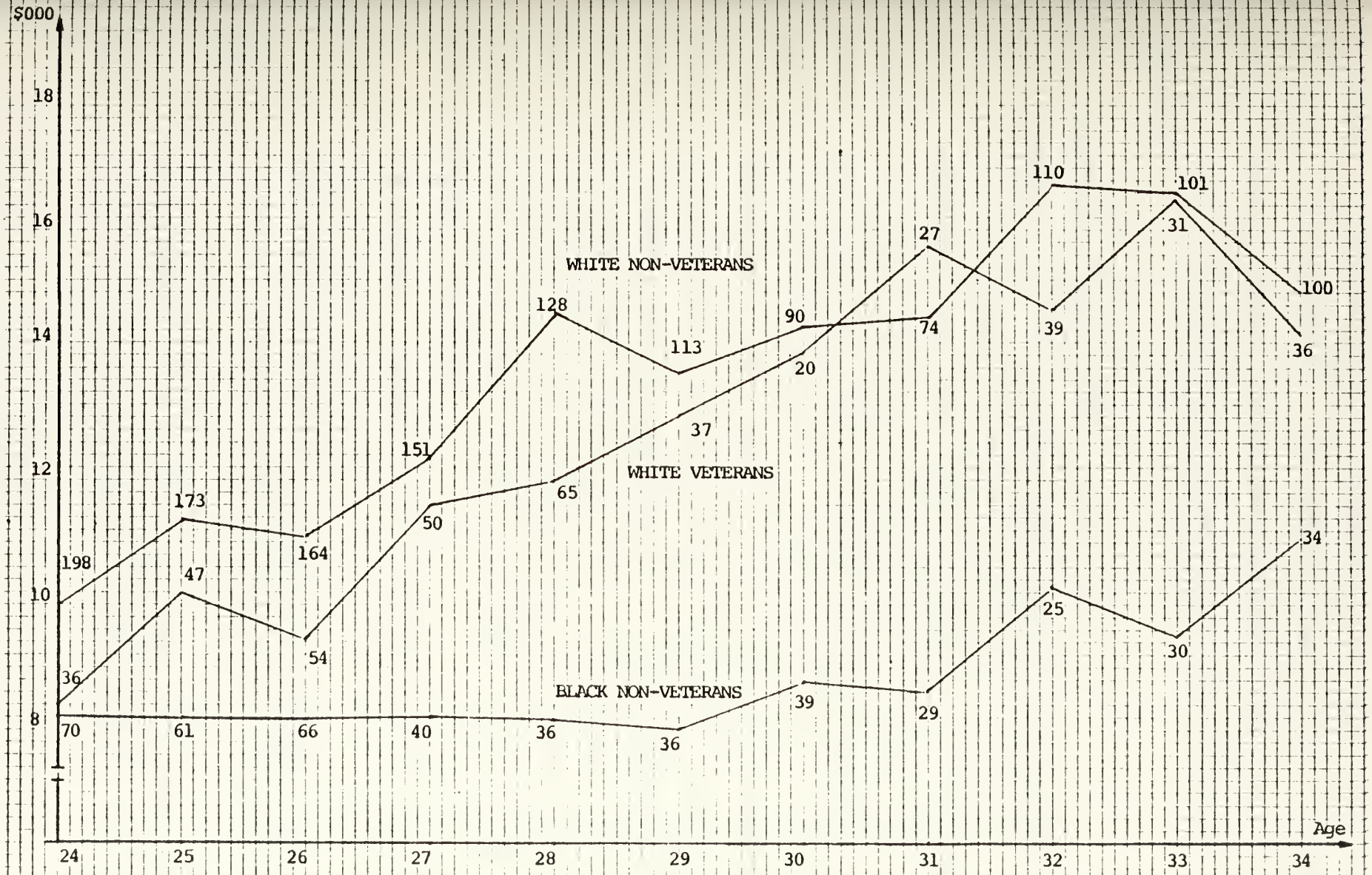


Figure 6: Annual Income by Age, Race and Veteran Status

conducted to control for the variability of each factor or attribute simultaneously. This methodology enables not only identification of those attributes that contribute or detract from earning capacity, but also the extent of their influence.

F. SUMMARY AND CONCLUSIONS

In summary, it would appear from the factors described and statistical analysis conducted, that black veterans display employment and income generating qualities that are superior to their non-veteran counterparts. However, for whites, the reverse is generally true, as non-veterans show superior qualities to veterans. Due to the range of variability on factors in the sample of veterans and non-veterans, it is not possible to attribute "veteran status" with employability or income enhancing qualities. If it is assumed that the sample of black and white veterans, as presented by this data, is representative of all blacks and whites who were enlisted or drafted during the 60's and early 70's, three conclusions can be drawn.

1. The military has recruited the better quality blacks but the poorer quality whites.

2. The methods of military manpower procurement used in this era failed to produce a military that was representative of society.

3. The average income by age, generated by white veterans when compared to white non-veterans, is consistently less.

The first two of these observations are supported by Reaghard (1980). He found black veterans were from higher socio-economic indexed families and displayed superior qualities to their civilian counterparts. For white veterans, however, the reverse was generally true. Moreover, Reaghard concluded the draft did not produce a military representative of society, while Moskos (1979) stated that conclusion about the All Volunteer Force. This raises the interesting question of how to achieve a representative military, which unfortunately exceeds the scope of this study. An attempt to precisely identify and quantify the contribution, if any, of veteran status will be conducted in the next chapter.

V. REGRESSION ANALYSIS WITH VETERAN STATUS

A. INTRODUCTION

The second hypothesis was to ascertain whether earnings received by those who had completed a tour of military duty were different from those earned by individuals who choose not to undertake military service. Formally stated,

H_0 = Military service is no different from obtaining work experience and training in the civilian sector when measured by income received in post-service employment.

As detailed in Chapter III, there was considerable variability in earnings attributes between the veterans and non-veterans in the sample. To simultaneously control for this variability, multiple regression analysis was utilized. By employing the multiple regression technique, it was possible to produce a predictive or explanatory model of earnings, as well as identify the comparative strengths or influences of the variables.

B. THE MODELS

Two regression models were constructed to test the hypothesis. Both models used similar explanatory variables, but each employed different dependent variables. Model 1 used as a dependent variable hourly pay rate in an attempt to

capture a "potential" rate of pay, while model 2 used as a dependent variable total income from wages and salaries. Each model is typical of the Mincer (1974) human capital estimating equation which is formally expressed by:

$$W = e^{a_0 + a_1 V_1 + \sum a_n EF_n}$$

where W is the dependent variable, a_0 is the constant, V is a dummy variable assuming the value zero for non-veterans and one for veterans, and $\sum EF$ is the sum of all the other earning factors. This equation is more commonly expressed as:

$$Ln(W) = a_0 + a_1 V_1 + \sum a_n EF_n$$

The use of the semi-logarithmic form is common in studies utilizing the investment in human capital approach. It is primarily used to reduce the positive skewness found in most earning distributions. By reducing the skewness, it is possible to enhance the statistical fit of the equation. That is, the amount of explained variation, as indicated by the R^2 for the prediction equation, is greatly increased. In addition, the resulting coefficients of variables from this equation enable two useful interpretations:

1. The expected percentage change in the dependent variable that would occur if one unit change in an explanatory or independent variable was implemented.

2. The rate of return accruing to the acquisition of an additional unit in the explantory or independent variable.

One aspect of the construction of the equation possibly requires further explanation. Work experience, which is derived by subtracting years of schooling plus five years of pre-schooling from age, was not used as a variable, i.e.,

Work experience = (Age - (Years of schooling + 5)).

This is a departure from Mincer's traditional earning equation, but the reasons for this departure were two-fold. First, Binder (1976) had found the work experience estimation to be unsuitable for members who are subject to broken work experience or labor market activity like "women", and "military" personnel. Secondly, when a Pearson correlation was computed using a derived work experience variable, work experience was found to be highly correlated with age ($r = .76$), and years of education ($r = .63$). This high level of intercorrelation or multicollinearity between the independent variables would increase the variance of the estimate and reduce the reliability and the significance of the coefficients of the variable. Moreover, the usefulness of using an explantory varible's coefficient that is subject to multicollinearity to indicate percentage changes or rates of return, as explained earlier, would be statistically incorrect.

C. THE VARIABLES

Two variables that were detailed in Chapter IV were not utilized in this regression model. These two variables were mental ability (IQ) and socio-economic status of the respondent's

parental home (SES). There were three reasons for the deletion of those variables from the analysis.

First, it was found, as expected, that both IQ (r = .46) and SES (r = .55) were highly correlated with education. This multicollinearity would thus detract from the accuracy and predictiveness of the education coefficient. As education is a key determinant of earnings, it is useful to employ its coefficient to estimate rate of return or percentage change in income attributable to an additional year of education. This would not have been possible if SES and IQ had been retained.

Second, both IQ and SES were variables that were constructed by the NLS center. The problems of collection and normalization of the collected data were considerable. Consequently, many cases failed to have these data recorded. As the regression equations used only cases that had responses to all variables, the reduction in the usable sample size was considerable. When SES and IQ were included, the usable sample for blacks, which was 503 (92 veterans and 411 non-veterans), fell to 164 (36 veterans and 128 non-veterans). For whites, the sample size was reduced from 1578 (363 veterans and 1215 non-veterans), to 1153 (291 veterans and 862 non-veterans).

Third, Cohen (1975) suggests that as a prudent rule of thumb the number of regressors used should be limited to not more than one fortieth of the sample size. As there were twelve regressors in model 2, this would require a minimum sample size of 480. It can be seen that the black sample only

just meets this criterion. This would not have been possible with the inclusion of intelligence and socio-economic status in the model. Variables used in the models are given below and summarized in Table 20.

1. Dependent Variable

As mentioned earlier, two earning measures were employed. First, model 1 used as a dependent variable LOGPAY. This variable was the natural logarithm of hourly rate of pay, HRLYPAY, as defined in Chapter IV. That is, LOGPAY = Ln(HRLYPAY). Equation 1 attempted to ascertain those factors which simultaneously affect hourly earnings of veterans and non-veterans. The structure of the equation was designed to capture more of the "potential" earning power of individual factors. It was hoped, therefore, to predict an hourly rate of pay that an individual may receive without regard to the number of additional financial fringe benefits he may receive due to tenure and special bonus payments.

Model 2 used as a dependent variable LOGINCO. This variable was derived by taking the natural logarithm of annual income or total wages and salaries received in 1976. That is, LOGINCO = Ln(Y). The structure of the equation was to identify the effects of the explanatory factors as detailed in Chapter IV on total earnings from all sources, received from an employer.

2. Independent Variables

The independent variables employed in each model are given in Table 20. These variables are constructed and

TABLE 20

REGRESSION MODELS

VARIABLES	DESCRIPTION	MODEL 1	MODEL 2
Dependent			
LOGPAY	Natural logarithm of hourly rate of pay	X	
LOGINCO	Natural logarithm of annual income		X
Independent			
VETERAN	Non-Veteran=0, Veteran=1	X	X
MARRY	Not-Married=0, Married=1	X	X
VOCTRG	No VOCTRG=0, VOCTRG=1	X	X
HEALTHY	Not Healthy=0, Healthy=1	X	X
REGION	Non South=0, South=1	X	X
SMSA	Non SMSA=0, SMSA=1	X	X
HGHSTED	Highest grade of schooling	X	X
TENURE	Years with current employer	X	X
TENSQ	$(\text{Tenure})^2$	X	X
WKSEMP	Weeks of employment in 1975-76	X	X
AGE76	Age in 1976	X	X
CJOBHRS	Hours worked per week		X

defined exactly as found in Chapter IV. One independent variable, TENSQ, did not appear in Chapter IV. This variable is defined as the square of tenure, and has been introduced to account for the diminishing returns one would expect to find with increased length of employment with the same employer. It is doubtful whether any employment situation exists where salary is completely related in direct proportion to length of service. Thus TENSQ is introduced to capture some of the diminishing effects of tenure over time, while TENURE accounts for the advantages of increasing length of service with an employer.

The only variation between model 1 and model 2 in independent variables is that model 2 included average hours worked per week. This was necessary as hours worked have an obvious and direct influence on annual income, and therefore its effect needed to be controlled.

3. Variable Correlation

To ensure that the correlation between variables was known and detailed, Pearson Correlation Coefficients for the multiple regression equations run are shown in Table 21 for blacks and Table 22 for whites. Except for tenure squared, TENSQ, which is obviously highly correlated with tenure, there was no other variable that had a correlation coefficient that exceeded .40.

4. Variable Assumptions

In running the regression equations. it was assumed that the variables for age, education, tenure, hours, and

TABLE 21

CORRELATION COEFFICIENTS FOR BLACKS WITH LOGPAY

	VETERAN	REGION	HEALTHY	VOCTRG	SMSA	MARRY	AGE76	HGHSTED	TENURE	WDSEMP	TENSQ	LOGPAY
VETERAN	1.000	-0.060	-0.023	0.195	0.178	0.026	-0.060	0.143	-0.213	-0.111	-0.171	0.075
REGION	-0.060	1.000	-0.049	-0.041	-0.403	0.090	0.013	-0.163	-0.116	0.033	-0.068	-0.366
HEALTHY	0.023	-0.049	1.000	-0.056	-0.045	0.041	-0.016	0.088	0.040	0.030	0.030	0.103
VOCTRG	0.195	-0.041	-0.056	1.000	0.149	0.057	-0.061	0.335	-0.050	0.070	-0.091	0.208
SMSA	0.178	-0.403	-0.045	0.149	1.000	-0.026	0.081	0.311	-0.009	0.050	-0.034	0.375
MARRY	0.026	0.093	0.041	0.057	-0.026	1.000	0.275	-0.011	0.184	0.058	0.155	0.153
AGE76	-0.060	0.013	-0.016	-0.061	-0.081	0.275	1.000	-0.158	0.339	0.039	0.336	0.039
HGHSTED	0.143	-0.163	0.088	0.335	0.311	-0.011	-0.158	1.000	-0.094	0.082	-0.127	0.363
TENURE	-0.213	-0.116	0.040	-0.050	-0.009	0.184	0.339	-0.094	1.000	0.310	0.926	0.199
WKSEMP	-0.111	0.033	0.030	0.070	0.050	0.058	0.039	0.082	0.310	1.000	0.189	0.139
TENSQ	-0.171	-0.068	0.030	-0.091	-0.034	0.155	0.336	-0.127	0.926	0.189	1.000	0.121
LOGPAY	0.075	-0.366	0.103	0.208	0.375	0.153	0.039	0.362	0.199	0.139	0.121	1.000

WITH LOGINCO

	VETERAN	REGION	HEALTHY	VOCTRG	SMSA	MARRY	AGE76
VETERAN	1.000	-0.063	0.028	0.210	0.179	0.030	-0.059
REGION	-0.063	1.000	-0.053	-0.039	-0.400	0.098	0.015
HEALTHY	0.028	-0.053	1.000	-0.045	-0.030	0.050	-0.004
VOCTRG	0.210	-0.039	-0.045	1.000	0.153	0.046	-0.062
SMSA	0.179	-0.400	-0.030	0.153	1.000	-0.020	-0.071
MARRY	0.030	0.098	0.050	0.046	-0.020	1.000	0.272
AGE76	-0.059	0.015	-0.004	-0.062	-0.071	0.272	1.000
HGHSTED	0.152	-0.161	0.073	0.349	0.319	-0.006	-0.160
TENURE	-0.218	-0.111	0.044	-0.056	-0.011	0.175	0.336
WKSEMP	-0.114	0.014	0.034	0.081	0.077	0.057	0.039
CJOBHRS	-0.047	0.053	0.069	-0.028	-0.145	0.031	0.049
TENSQ	-0.175	-0.061	0.038	-0.101	-0.035	0.150	0.331
LOGINCO	-0.042	-0.210	0.125	0.162	0.298	0.158	0.075

TABLE 21 (CONT.)

	LOGINCO	HGHSTED	TENURE	WKSEMP	CJOBHRS	TENSQ
VETERAN	-0.042	0.152	-0.218	-0.114	-0.047	-0.175
REGION	-0.210	-0.161	-0.111	0.014	0.053	-0.061
HEALTHY	0.125	0.073	0.044	0.034	0.069	0.038
VOCTRG	0.162	0.349	-0.056	0.081	-0.028	-0.101
SMSA	0.298	0.319	-0.011	0.077	-0.145	-0.035
MARRY	0.158	-0.006	0.175	0.057	0.031	0.150
AGE76	0.075	-0.160	0.336	0.039	0.049	0.331
HGHSTED	0.333	1.000	-0.122	0.064	-0.002	-0.157
TENURE	0.284	-0.122	1.000	0.300	0.020	0.928
WKSEMP	0.603	0.064	0.300	1.000	0.034	0.183
CJOBHRS	0.069	-0.002	0.020	0.034	1.000	0.023
TENSQ	0.170	-0.157	0.928	0.183	0.023	1.000
LOGINCO	1.000	0.333	0.284	0.603	0.069	0.170

TABLE 12

CORRELATION COEFFICIENTS FOR WHITES WITH LOGPAY

	VETERAN	REGION	HEALTHY	VOCTRG	SMSA	MARRY	AGE76	HGHSTED	TENURE	WKSEMP	TENSQ
VETERAN	1.000	-0.023	0.061	0.090	0.031	0.028	0.055	-0.071	-0.112	-0.029	-0.108
REGION	-0.023	1.000	-0.042	-0.039	-0.123	0.035	-0.031	-0.130	-0.072	0.011	-0.057
HEALTHY	0.061	-0.042	1.000	0.024	0.080	-0.030	-0.013	0.100	0.019	0.033	0.009
VOCTRG	0.090	-0.039	0.024	1.000	0.092	0.098	0.099	0.110	-0.023	0.097	-0.038
SMSA	0.031	-0.123	0.080	0.092	1.000	-0.081	0.009	0.042	0.005	0.046	0.000
MARRY	0.028	0.035	-0.030	0.098	-0.081	1.000	0.215	-0.139	0.139	0.105	0.021
AGE76	0.055	-0.031	-0.013	0.099	0.009	0.215	1.000	-0.006	0.373	0.109	0.383
HGHSTED	-0.071	-0.130	0.100	0.110	0.142	-0.139	-0.006	1.000	-0.098	0.076	-0.118
TENURE	-0.112	-0.072	0.019	-0.023	0.005	0.139	0.373	-0.098	1.000	0.270	0.954
WKSEMP	-0.029	0.011	0.033	0.097	0.046	0.105	0.109	0.076	0.270	1.000	0.190
TENSQ	-0.108	-0.057	0.009	-0.038	0.000	0.121	0.383	-0.118	0.954	0.190	1.000
LOGPAY	0.012	-0.174	0.092	0.166	0.246	0.184	0.329	0.267	0.215	0.186	0.174

WITH INCOME

	VETERAN	REGION	HEALTHY	VOCTRG	SMSA	MARRY	AGE76
VETERAN	1.000	-0.019	0.059	0.095	0.031	0.032	0.061
REGION	-0.019	1.000	-0.039	-0.041	-0.131	0.040	-0.028
HEALTHY	0.059	-0.039	1.000	0.025	0.076	-0.029	-0.001
VOCTRG	0.095	-0.041	0.025	1.000	0.090	0.103	0.099
SMSA	0.031	-0.131	0.076	0.090	1.000	-0.082	0.008
MARRY	0.032	0.040	-0.029	0.103	-0.082	1.000	0.221
AGE76	0.061	-0.028	-0.001	0.099	0.008	0.221	1.000
HGHSTED	-0.074	-0.138	0.098	0.111	0.142	-0.133	-0.006
TENURE	-0.109	-0.070	0.014	-0.019	0.000	0.138	0.383
WKSEMP	-0.028	0.011	0.030	0.088	0.035	0.105	0.122
CJOBHRS	-0.048	0.039	-0.036	-0.023	-0.059	0.073	0.031
TENSQ	-0.105	-0.055	0.006	-0.034	-0.003	0.123	0.391
LOGINCO	-0.035	-0.131	0.116	0.162	0.171	0.206	0.312

TABLE 22 (CONT.)

	LOGINCO	HGHSTED	TENURE	WKSEMP	CJOBHRS	TENSQ
VETERAN	-0.035	-0.074	-0.109	-0.028	-0.048	-0.105
REGION	-0.131	-0.138	-0.070	0.011	0.039	-0.055
HEALTHY	0.116	0.098	0.014	0.030	-0.036	0.006
VOCTRG	0.162	0.111	-0.019	0.088	-0.023	-0.034
SMSA	0.171	0.142	0.000	0.035	-0.059	-0.003
MARRY	0.206	-0.133	0.138	0.105	0.073	0.123
AGE76	0.312	-0.006	0.383	0.122	0.031	0.391
HGHSTED	0.248	1.000	-0.098	0.064	0.049	-0.117
TENURE	0.310	-0.098	1.000	0.266	-0.023	0.954
WKSEMP	0.527	0.064	0.266	1.000	0.014	0.189
CJOBHRS	0.075	0.049	-0.023	0.014	1.000	-0.017
TENSQ	0.238	-0.117	0.954	0.189	-0.017	1.000
LOGINCO	1.000	0.248	0.310	0.527	0.075	0.238

weeks of employment approximate continuous varibles. Variables for vocational training, veteran status, marriage, health status, geographical regions, and SMSA retained their dichotomous nature, and were introduced as dummy variables into the equation.

D. RESULTS OF THE BASIC MODEL

Both models were run for each racial grouping. Table 23 details the results obtained for blacks, while Table 24 gives the results for whites. Generally, it was found that:

1. All equations were significant at the .001 level of significance.
2. The models gave greater R^2 values for blacks than for whites.
3. Model 2 was superior to model 1 when tested by goodness of fit, or ability to explain earnings variance. That is, model 2 consistently produced a larger R^2 than did model 1.
4. As one would expect, both poor health and residence in the South detracted from earnings. Similarly, as expected, marriage, residence in a SMSA, and vocational training gave positive returns to earnings. These five factors proved to be consistent in each equation regardless of model or race.
5. The models showed particular factors had greater or lesser significance due to the influence of race.

The last result should not be surprising. The analysis in Chapter IV had indicated that the black veterans were socio-economically superior to black non-veterans, while the reverse was true for whites. It was therefore to be expected that earning attributes had different degrees of influence in the equation due to race. For this reason, it is appropriate to discuss the results by race.

TABLE 23

REGRESSION ANALYSIS OF HOURLY RATE OF PAY FOR BLACKS

Dependent Variable LOGPAY: $\bar{x}$ = $4.46

INDEPENDENT VARIABLES	B	F
SMSA	.177	21.183 ***
HGHSTED	.037	31.785 ***
TENURE	.041	11.341 ***
REGION	-.220	28.973 ***
MARRY	.141	11.591 ***
TENSQ	-.002	4.632 **
VOCTRG	.069	3.981 **
HEALTHY	.121	3.508 *
WKSEMP	.001	0.539
VETERAN	.017	0.165
AGE76	.002	0.131
(CONSTANT)	5.104	

R^2 = .34 d.f. = (11;479) F = 22.5 ***

N = 491 (91 Veterans and 400 non-veterans)

REGRESSION ANALYSIS OF ANNUAL INCOME FOR BLACKS

Dependent Variable LOGINCO: $\bar{x}$ = $8,484

INDEPENDENT VARIABLES	B	F
WKSEMP	.032	227.668 ***
HGHSTED	.058	47.286 ***
REGION	-.170	10.024 ***
MARRY	.177	10.767 ***
SMSA	.220	19.023 ***
TENURE	.050	9.230 ***
HEALTHY	.201	5.903 **
CJOBHRS	.006	4.849 **
TENSQ	-.002	4.439 **
AGE76	.009	1.530
VETERAN	-.053	0.853
VOCTRG	.020	0.223
(CONSTANT)	5.649	

R^2 = .54 d.f. = (12;490) F = 48.6***

N = 503 (92 veterans and 411 non-veterans)

*** significant at .01 level
** significant at .05 level
* significant at .01 level

TABLE 24

REGRESSION ANALYSIS OF HOURLY RATE OF PAY FOR WHITES

Dependent Variable LOGPAY: $\bar{x}$ = $6.19

INDEPENDENT VARIABLES	B	F	
AGE76	.032	100.001	***
HGHSTED	.037	111.863	***
SMSA	.177	80.628	***
MARRY	.173	48.055	***
TENURE	.036	20.117	***
REGION	-.091	22.483	***
TENSQ	-.002	11.272	***
VOCTRG	.062	9.845	***
WKSEMP	.003	8.227	***
HEALTHY	.077	5.179	**
VETERAN	.006	0.088	
(CONSTANT)	4.303		

R^2 = .30 d.f. = (11;1501) F = 60.00 ***

N = 1572 (363 veterans and 1209 non-veterans)

REGRESSION ANALYSIS OF ANNUAL INCOME FOR WHITES

Dependent Variable: LOGINCO: $\bar{x}$ = $12,769

INDEPENDENT VARIABLES	B	F	
WKSEMP	.032	430.751	***
AGE76	.035	78.518	***
HGHSTED	.045	104.621	***
MARRY	.220	47.472	***
SMSA	.160	40.239	***
TENURE	.065	40.366	***
TENSQ	-.003	22.245	***
REGION	-.101	17.024	***
HEALTHY	.174	15.765	***
CJOBHRS	.004	10.919	***
VOCTRG	.076	8.863	***
VETERAN	-.035	1.620	
(CONSTANT)	5.282		

R^2 = .47 d.f. = (12,1565) F = 112.73 ***

N = 1578 (363 veterans and 1215 non-veterans)

*** significant at .01 level
** significant at .05 level

1. Blacks

Model 1 had a statistically significant equation that gave an R^2 of .34. Except for weeks of employment, age, and veteran status, all other coefficients in the equation were significant at the .05 level of significance or higher than the .05 level of significance. The two most influential factors were education and tenure. Both education and tenure gave a rate of return of four percent to individuals for each additional year of schooling, or tenure possessed. In contrast, veteran status made only a total contribution of two percent, or, on the average, eight cents per hour ($4.66 x .017).

Model 2 for blacks was better than model 1, in that it could explain 54 percent of the variance in annual income. (R^2 = .54.) However, this model also had three factors whose coefficients were not significant at the .05 level: age, vocational training, and veteran status. Once again, education with a rate of return of six percent for an additional year of schooling and tenure with a rate of return of five percent for an additional year of service with the same employer, were among the most influential factors. As expected, weeks of employment also gave a percentage change of three percent for an additional week of employment. Veteran status, however, had a negative 5.3 percent return, which for the average veteran would mean a loss of $450 on his annual income ($8484x - .053).

From the above analysis it is apparent that for blacks, veteran status has no positive influence in the generation of income. In fact, veteran status has a possible negative effect, due to loss of income through loss of tenure, and weeks of employment. Chapter IV had indicated that veterans had on the average, 1.8 years less tenure and 2.5 weeks less employment per year than non-veterans. These figures were statistically significant at the .05 level.

2. Whites

Model 1 for whites had a statistically significant predictive equation at the .01 level of significance, and an R^2 value of .30. An examination of Table 24 shows that all explanatory variable coefficients except veteran status were significant. Here again, education, and tenure were also very influential. A rate of return of four percent accrued to members for an additional year of schooling or tenure possessed. Veteran status, although positive, had a less than one percent return, or an average contribution of four cents per hour, to hourly wage rate ($6.19 x .006).

For whites, Model 2 was superior to Model 1. Not only did model 2 have a far higher overall F value for the equation, but R^2 increased to .47. In addition, all explantory variables were significant at the .01 level, except veteran status. Factors that proved to be most influential in the determination of income were; weeks of employment, education and tenure, with respective returns of 3, 5, and 7 percent

for each additional unit possessed. Veteran status on the other hand had a negative influence of $447 per year for the average white veteran ($12,769x - .035). These results would indicate that veteran status fails to contribute positively towards earnings.

To test whether the effects of veteran status diminish as the time period since the member last served lengthens, Model 2 for whites was run for ten periods. That is, groups of veterans who had been in the civilian sector for only one year, two years, and so on, were consecutively deleted. It would appear from these results, which are to be found in Table 25, that the size of the negative coefficient for veterans does not diminish until after the seventh year. Thus, the average veteran can expect financial loss due to serving in the military for periods in excess of seven years after his service.

Before leaving this section, it is appropriate to comment on the fact that in no equation did the coefficient for veteran status prove to be statistically significant. This in no way reduces its importance in the prediction equation, as the total equation proved to be significant as measured by the F test, at the .01 level of significance. However, the results of using an individual coefficient that was not significant to predict individual returns accruing to that variable, is possibly subject to error.

To test if veteran status made any contribution to the equations, hierarchical stepwise regression was conducted.

TABLE 25

VETERAN COEFFICIENT OVERTIME FOR INCOME FOR WHITES

YEARS SINCE LAST MILITARY SERVICE	VALUE OF VETERAN COEFFICIENT	F VALUE OF EQUATION	SAMPLE SIZE			EQUATION R^2
			VETERANS	NON VETERAN	TOTAL	
GE TO 1	-.035	112.73***	363	1215	1578	.47
GE TO 2	-.038	113.60***	361	1215	1576	.47
GE TO 3	-.030	110.55***	350	1215	1565	.46
GE TO 4	-.032	104.99***	322	1215	1537	.45
GE TO 5	-.049	105.98***	287	1215	1502	.46
GE TO 6	-.042	102.74***	248	1215	1463	.46
GE TO 7	-.061*	98.61***	187	1215	1402	.46
GE TO 8	-.019	95.65***	126	1215	1341	.46
GE TO 9	-.018	97.19***	103	1215	1318	.47
GE TO 10	-.010	96.78***	99	1215	1314	.47

It was found that veteran status had a significant F value until tenure or weeks of employment entered the equation. These two factors impact via correlation of tenure with veteran status, and tenure with weeks of employment. Therefore, when the forward stepwise regression is utilized those variables that have the most significant addition to explained variance enter first. Thus, as both tenure and weeks of employment had a greater contribution to explained variance, they enter the equation prior to veteran status, and are credited with the shared variance with veteran status. That is, the standard F test for a partial regression coefficient gives credit to each variable only for its incremental contribution after all the other independent variables have been introduced in the equation. Veteran status had little to offer to explained variance when it entered the equation last.

E. SUMMARY

This chapter tested the hypothesis that work experience and training gained by members who undertook military service is no different in its effect on income than for members who gained work experience and training in the civilian sector. The two models that tested the hypothesis produced conflicting results. Model 1 produced positive returns to veterans, while Model 2 produced negative returns to veterans. However, Model 2 gave a better explanation of variance or overall better goodness of fit. In addition, Model 2 predicted total annual income, which is a better measurement of economic well being.

Thus, it is possible to reject the null hypotheses and conclude that veteran status is detrimental to future earnings.

These results further highlighted the plight of veterans. Education, tenure and weeks of employment which do not favor white veterans have high rates of return. In particular, it would appear continuous civilian employment assists future income generation more than an enlistment period in the military. The disruptive effect of military service apparently creates a penalty on future earnings of veterans regardless of other attributes possessed.

This analysis would lead one to conclude that the military, as a method of investing in human capital, is ineffective. Better returns are possible if individuals invest in additional years of schooling, or specific, and general training offered by firms who give employment security.

However, this analysis did not identify those members who enlist to avoid the high unemployment rates prevalent among youths. Even though veterans in 1976 appear to suffer financially, longitudinal studies may reveal that civilian members with similar attributes suffered high levels of unemployment during earlier periods in their life. Thus, the security of military employment for veterans may compensate for part of the post service losses in income. This is one area where insufficient research has been conducted and would be necessary prior to conclusive statements of lifetime benefits can be made. For policy makers, this analysis would suggest the best possible way of diminishing the effects of veteran service

is to provide extra education during and immediately after military service. Other methods that would be appropriate are tax cuts for veterans or employers of veterans.

In summary, the conclusions that can be drawn from these results are:

1. Veteran status can not be said to have any positive influence on post service earnings. This cross sectional analysis would indicate that work experience and training gained through military service is not superior to work experience and training obtained in the civilian sector. In fact, it is possible that veteran status could further detract from future income, due to losses in tenure, and employment. These factors seem to be related to military service, and the transitionary period of employment on return to the civilian sector.

2. Youth contemplating enlisting in the military service for other than careerist reasons would be better advised to seek additional years of schooling, or obtain jobs in which tenure has positive influences.

This result would confirm recent studies by Bolin, Hess and Little (1980) who analyzed cross sectional data of samples from the NLS youths survey utilizing 1969 and 1971 data. Their conclusions were that short run economic benefits to having served in the military were negligible.

The next chapter attempts to identify those patterns in military service that tend to influence returns in post service earnings. This analysis should assist in determining

which veterans lose the least as a result of their military service.

VI. SPECIFIC MILITARY INFLUENCES ON POST SERVICE EARNINGS

A. INTRODUCTION

This chapter examines the influence on post-service earnings of various methods of participation in military service. An individual contemplating military service has various options he may exercise. These options vary from the selection of the branch of service and the enlistment period he desires, to specifying particular skills and training he wishes to undertake. Due to the draft many of those in the 1976 sample did not have freedom of choice over all of these options. Many members, however, did have some discretion over the type and length of training. No effort has been made in this study to identify specifically the various types of training undertaken. It is assumed that length of the training generally would indicate a selection process related to ability. Thus, those who received longer periods of training are assumed to have been chosen because they were better able to perform jobs requiring greater skill and expertise.

By studying whether specific military experiences enhance or diminish post-service earnings, policy makers may be able to determine appropriate compensation levels. Policies may need to be established that vary enlistment periods to obtain economic returns to the military, depending upon the particular training given to individuals.

B. THE MODELS

Two regression models similar in design to those used in Chapter V were employed. The same dependent variables were utilized, but military specific independent variables were also introduced. The actual equation used was the semi-logarithmic form expressed by:

$$\ln(W) = a_0 + a_1N + a_2A + a_3M + \sum a_nEF_n$$

where W is the dependent variable, a_0 is the constant, N, A, and M are dummy variables indicating Navy, Air Force or Marine Corps. Finally, a_nEF_n were either specific military or other earning factors in the equation. All of the advantages of using the logarithmic form as mentioned in Chapter V are still relevant. The exceptions to this statement are the service variables, which required a special binary formulation.

C. THE VARIABLES

The dichotomous variables used in Chapter V were not employed in these models. It was thought that the influence of those particular variables would detract from simplifying, and focusing attention on the military specific variables. Moreover, the number of regressors was still ten, but the sample size was only 394. Consequently it was considered prudent to keep Cohen's (1975) rule of thumb, with regard to a one to forty ratio of regressors to sample size.

Other variables deleted from this model were age and the square of tenure. Age was deleted due to its high correlation

with the variable that expressed the period of time since the member last served in the military (LASTMIL). The reason for this high correlation was because 70 percent of all service members enter at an age under twenty years. In addition, 78 percent do not serve longer than their first term [Binkin, et al., 1979]. Thus the majority of youths join the services between 18 and 20 and leave between 22 and 24 years of age. Any variable that measured the period of time since the member last served was highly age related. The square of tenure was deleted because of the relatively short period of tenure reported. Veterans in the sample averaged only four years tenure, which was considered insufficient to incur diminishing returns.

The dependent variables utilized in the regression analysis were hourly rate of pay and annual income. These variables retained the same definition as detailed in Chapter IV. Other variables retained for the military specific regression models were the independent variables for education, tenure, and weeks of employment. From the experience gained in Chapter V, it was obvious that these three independent variables have considerable influence in the determination of income. Their retention seemed essential if the influence and the variability of these factors were to be controlled. These three independent variables retained an identical format, and definition as detailed in Chapters IV and V.

New explanatory variables introduced into the regression equation to cover specific military influences that required

controlling were branch of service, race, and military specific continuous variables.

1. Branch of Service

A set of three dummy variables was created by treating service in the Navy, Air Force, and Marine Corps as separate variables. By assigning the value of one, for its presence, and a zero for its absence in each of these three military categories, it was possible to account for service in all four branches. Thus a member who belonged to the Navy would be scored one on the variable representing Navy, but zero on the variables representing Air Force or Marine Corps. The influence of Army service was included in the constant value. This detracts from the intuitively appealing individual coefficients for each service, but was essential to produce the model following the techniques recommended by both Cohen (1975) and Nye (1975). Table 26 details the method of binary coding.

2. Race

It had been anticipated from Chapter V that the sample for veterans should have numbered approximately 500. However many veterans failed to respond to specific military questions and the sample was reduced to 393. Only cases having responses to all variables were considered in the regression equation. There were 74 black veterans and 393 white veterans in the sample analyzed. A dummy variable was created for RACE. Blacks were assigned the value zero and whites the value one.

TABLE 26

BINARY CODING OF BRANCH OF SERVICE

TYPE OF SERVICE	Names of Dummy Variables NAVY	AIR	MARINE
Navy	1	0	0
Air Force	0	1	0
Marine Corps	0	0	1
Army	0	0	0

3. Military Specific Variables

Three continuous variables specifying type of military service were constructed to capture the effect of various patterns of participation in the military.

a. MILTIME

This variable was constructed to gauge the effect of the various periods of time spent in the military. The range extended from 24 months to those who had completed 8 years of service. As most services have varying terms of enlistment, one would have expected to find specific periods of time spent in the military correlated with a particular service. This, however, was not so, the highest correlation being r = .03 for the Navy.

b. MILTRG

Human capital theory proposes that time spent in formal training should enhance productivity and thus favorably influence the "price" employers are willing to pay for an individual's labor. This variable accounts for the months of

formal training that were additional to "boot camp" or basic training. Months of training, according to human capital theory, should enhance future earnings if the member chose to enter a comparable civilian occupation. Training undertaken may also indicate to an employer that an individual possesses attributes that are conducive to additional training. This last statement is confirmed by Norrblom (1976) who found that the more able servicemen were selected for training.

c. LASTMIL

To indicate the number of years since a respondent completed his military tour, a variable was constructed by subtracting his year of discharge from 1977. This is an important variable because the longer a veteran has been out of the service the greater the opportunities he has had to:

(1) Take advantage of the G.I. Bill benefits.

(2) Search for a job that optimizes his attributes.

(3) Increase his tenure with an employer, and obtain those benefits that accrue to tenure.

It was therefore necessary to control for these effects in the regression equation. Table 27 gives a summary of the dependent and independent variables used in each of the regression equations.

The main purpose of this chapter was to use multiple regression analysis to identify the effects of specific patterns of participation in the military. To give the regression results a more meaningful perspective, distribution characteristics of variables have been produced. Table 28 gives

TABLE 27

VARIABLES UTILIZED IN THE MILITARY MODELS

VARIABLES	DESCRIPTION	MODEL 1	MODEL 2
Dependent			
LOGPAY	Natural logarithm of hourly rate of pay	X	
LOGINCO	Natural logarithm of annual income		X
Independent			
NAVY	Non-Navy=0, Navy=1	X	X
AIR	Non-Air Force=0, Air Force=1	X	X
MARINE	Non-Marine=0, Marine=1	X	X
RACE	Black=0, White=1	X	X
MILTIME	Time spent in service in months	X	X
MILTRG	Months of additional training taken	X	X
LASTMIL	Period in years since active duty	X	X
HGHSTED	Highest grade of schooling	X	X
TENURE	Years with current employer	X	X
WKSEMP	Weeks of employment in 75-76	X	X

TABLE 28

DESCRIPTIVE STATISTICS OF VARIABLES IN THE MILITARY MODEL

HOURLY PAY BY BRANCH OF MILITARY SERVICE

HRLYPAY	Navy	Army	Air Force	Marine	DF	F	P
Mean	$6.13	5.73	5.99	5.22	3	2.27	.08*
Std Dev	$2.51	2.23	2.55	2.22	553	552	
N	107	281	108	61			

Scheffes Test: No two branches of service were significantly different at the .05 level

TOTAL WAGES AND SALARIES BY BRANCH OF MILITARY SERVICE

Y(income)	Navy	Army	Air Force	Marine	DF	F	P
Mean	$11,502	11,166	12,122	10,070	3	1.70	.17
Std Dev	$6,163	5,934	6,139	5,078	561		
N	110	285	110	61			

Scheffes Test: No two branches of service were significantly different at the .05 level

NUMBER OF MONTHS SPENT IN THE MILITARY BY BRANCH OF MILITARY SERVICE

MILTIME	Navy	Army	Air Force	Marine	DF	F	P
Mean	42.35	31.58	45.97	38.85	3	54.54	<<.01***
Std Dev	10.64	11.77	9.48	12.18	562		
N	110	285	110	61			

Scheffes Test: Army was significantly less than all other services, and the Marine Corps was significantly less than the Air Force at the .05 level

NUMBER OF MONTHS OF ADDITIONAL TRAINING BY BRANCH OF MILITARY SERVICE

MILTRG	Navy	Army	Air Force	Marine	DF	F	P
Mean	4.45	3.24	3.62	2.66	3	1.38	.25
Std Dev	8.30	5.06	5.85	3.90	495		
N	99	239	108	53			

Scheffes Test: No two branches of service were significantly different at the .05 level.

TABLE 28 (CONT.)

NUMBER OF YEARS SINCE MILITARY SERVICE BY BRANCH OF SERVICE

LASTMIL	Navy	Army	Air Force	Marine	DF	F	P
Mean	7.18	7.33	6.12	6.77	3	3.53	.01***
Std Dev	3.57	3.27	3.53	3.03	550		
N	107	274	108	60			

Scheffes Test: No two branches of service were significantly different at the .05 level

EDUCATION BY BRANCH OF MILITARY SERVICE

HGHSTED	Navy	Army	Air Force	Marine	DF	F	P
Mean	13.22	12.96	13.44	12.19	3	4.85	<<.01**
Std Dev	1.91	2.10	1.96	1.48	483		
N	95	248	92	52			

Scheffes Test: Marine Corps had significantly lower levels of education than the Air Force or Navy at the .05 level

TENURE BY BRANCH OF SERVICE

TENURE	Navy	Army	Air Force	Marine	DF	F	P
Mean	3.94	4.4	4.16	4.37	3	.64	.60
Std Dev	3.00	2.26	3.14	3.45	561		
N	110	284	110	61			

Scheffes Test: No two groups were significantly different at the .05 level

WEEKS OF EMPLOYMENT BY BRANCH OF MILITARY SERVICE

WKSEMP	Navy	Army	Air Force	Marine	DF	F	P
Mean	49.03	48.00	49.8	48.1	3	.97	.39
Std Dev	8.62	10.45	8.84	9.49	532		
N	106	267	105	58			

Scheffes Test: No two groups are significantly different at the .05 level

the means and standard deviations of each variable. In addition, the means by branch of service are tested to determine if they are significantly different, using the SPSS oneway analysis of variance program. The means were tested for posteriori contrasts by the Scheffe technique. The Scheffe test uses a single range value for all comparisons, not just pairwise comparisons. Thus, it is much stricter than other tests and is exact, even for unequal group sizes [Nye, 1975].

The format of Table 28 is standardized to give the variable name, and the mean, standard deviation, and sample size for each of the four branches of service. Caution should be used in interpreting these results as they have not been broken down by race. Thus the Army, which had a 35 percent black participation rate in its sample, would possibly report a lower hourly pay rate than say the Navy with a sample containing only 9 percent blacks. Following these statistics the results of the Scheffe test are given.

D. RESULTS

Table 29 gives the results of Model 1 and Model 2. The Pearson correlation coefficients for both models are detailed in Table 30. Generally speaking, Model 2 is the superior model using goodness of fit as the test criterion. While both models produced statistically significant equations at the .01 level of significance, Model 2 had an R^2 of .54 compared to Model 1's R^2 of .31. Both models give some interesting insights into the pattern of military participation that enhances earnings.

TABLE 29

REGRESSION RESULTS OF MILITARY MODELS

REGRESSION ANALYSIS OF HOURLY RATE OF PAY FOR VETERANS

Dependent Variable: LOGPAY $\bar{x}$ = $5.80

INDEPENDENT VARIABLE	B	F
RACE	.122	7.165 ***
HGHSTED	.047	28.148 ***
NAVY	.082	2.807 *
MARN	-.090	2.275
AIRF	.049	1.005
MILTIME	.001	0.376
MILTRG	-.005	2.642
LASTMIL	.029	24.890 ***
TENURE	.022	12.859 ***
WKSEMP	.006	13.233 ***
(CONTSTANT)	5.008	

R^2 = .31 d.f. = (10,382) F = 17.07 ***
N = 393 (319 white veterans and 74 black veterans)

REGRESSION ANALYSIS OF ANNUAL INCOME FOR VETERANS

Dependent Variable: LOGINCO $\bar{x}$ = $11,299

INDEPENDENT VARIABLE	B	F
RACE	.189	8.088 ***
HGHSTED	.056	19.197 ***
NAVY	-.090	1.549
MARN	-.074	0.719
AIRF	.060	0.728
MILTIME	.0005	0.068
MILTRG	-.0002	0.002
LASTMIL	.029	11.695 ***
TENURE	.027	8.827 ***
WKSEMP	.039	223.709 ***
(CONSTANT)	6.090	

R^2 = .54 d.f. = (10,383) F = 44.18 ***
N = 393 (319 white veterans and 74 black veterans)

TABLE 30

CORRELATION COEFFICIENTS OF MILITARY MODELS

MODEL ONE DEPENDENT VARIABLE HOURLY RATE OF PAY

	RACE	LASTMIL	NAVY	MARN	AIRF	MILTRG	MILTIME	WKSEMP	HGHSTED	TENURE	LOGPAY
NRACE	1.000	0.192	0.136	-0.053	-0.047	0.112	-0.046	0.190	0.127	0.140	0.262
LASTMIL	0.192	1.000	0.047	-0.028	-0.117	0.383	-0.162	0.104	-0.080	0.420	0.331
NAVY	0.136	0.047	1.000	-0.164	-0.257	0.091	0.203	0.018	0.056	-0.072	0.098
MARN	-0.053	-0.028	-0.164	1.000	-0.176	-0.022	0.027	-0.028	-0.163	-0.011	-0.148
AIRF	-0.047	-0.117	-0.257	-0.176	1.000	-0.043	0.308	0.060	0.086	0.015	0.032
MILTRG	0.112	0.383	0.091	-0.022	-0.043	1.000	0.011	0.049	-0.050	0.155	0.067
MILTIME	-0.046	-0.162	0.203	0.027	0.308	0.011	1.000	-0.008	0.021	-0.129	-0.067
WKSEMP	0.190	0.104	0.018	-0.028	0.060	0.049	-0.008	1.000	0.102	0.360	0.311
HGHSTED	0.127	-0.080	0.056	-0.163	0.086	-0.050	0.021	0.102	1.000	-0.054	0.259
TENURE	0.140	0.420	-0.072	-0.011	0.015	0.155	-0.129	0.360	-0.054	1.000	0.342
LOGPAY	0.262	0.331	0.098	-0.148	0.032	0.067	-0.067	0.311	0.259	0.342	1.000

MODEL TWO DEPENDENT VARIABLE ANNUAL INCOME

	RACE	LASTMIL	NAVY	MARN	AIRF	MILTRG	MILTIME	WKSEMP	HGHSTED	TENURE	LOGINCO
NRACE	1.000	0.194	0.136	-0.051	-0.041	0.113	-0.039	0.188	0.128	0.144	0.270
LASTMIL	0.194	1.000	0.045	-0.030	-0.106	0.384	-0.156	0.104	-0.082	0.423	0.256
NAVY	0.136	0.045	1.000	-0.162	-0.256	0.089	0.200	0.019	0.055	-0.068	-0.019
MARN	-0.051	-0.030	-0.162	1.000	-0.177	-0.022	0.028	-0.028	-0.161	-0.012	-0.082
AIRF	-0.041	-0.106	-0.256	-0.177	1.000	-0.039	0.312	0.059	0.084	0.019	0.086
MILTRG	0.113	0.384	0.089	-0.022	-0.039	1.000	0.012	0.049	-0.051	0.157	0.100
MILTIME	-0.039	-0.156	0.200	0.028	0.312	0.012	1.000	-0.008	0.021	-0.123	-0.032
WKSEMP	0.188	0.104	0.019	-0.028	0.059	0.049	-0.008	1.000	0.102	0.359	0.667
HGHSTED	0.128	-0.082	0.055	-0.161	0.084	-0.051	0.021	0.102	1.000	-0.054	0.216
TENURE	0.144	0.423	-0.068	-0.012	0.019	0.157	-0.123	0.359	-0.054	1.000	0.398
LOGINCO	0.270	0.256	-0.019	-0.082	0.086	0.100	-0.032	0.667	0.216	0.398	1.000

1. Model 1

This model used hourly rate of pay as the dependent variable. As it was required to binary code the branches of service and use the Army variable as a reference category, the coefficients for the services require an additional computation to give the comparative value of a particular branch of service. Since the value attributable to Army is contained within the constant, it is best to assume that this is the Army value and subtract or add the other services coefficients from this value. Using this methodology the coefficients for each individual service are;

a. Army: 5.01

b. Navy: (5.01 + .08) = 5.09

c. Air Force: (5.01 + .05) = 5.06

d. Marine Corps: (5.01 - .09) = 4.92

On a comparative basis, it can be seen that military service in the Navy is the most profitable when utilizing hourly pay as the dependent variable. As all other variables are controlled by the regression analysis, it is possible to calculate the comparative percentage advantage associated with service in a particular branch of the military. For example, the percentage advantage of service in the Navy over the Marine Corps, in relation to hourly pay, is 19 percent. This is calculated by computing the returns to Navy service, subtracting the returns to the Marine Corps, and dividing the resulting amount by returns to the Marine Corps,

$$\frac{e^{5.09} - e^{4.92}}{e^{4.92}} = .185 \simeq 19\%$$

As expected, education, tenure, and weeks of employment had positive coefficients. LASTMIL also had a positive coefficient indicating the longer the period a respondent had been in the civilian labor market, the greater would be his pay. We find, however, a small negative coefficient for the amount of time spent in the military (MILTIME). Military time, it would appear, detracts from productive time spent in adjusting to the civilian labor markets.

MILTRG, which controls for the months of training received by an individual has a small negative coefficient of -.005. This result is totally against intuition and economic theory. As Model 2 also gave a negative coefficient to military training, a discussion on this aspect will be delayed until an examination of that model has been conducted.

In summary, Model 1 would suggest that a member entering the military with no particular service preference, would choose the Navy, Air Force, Army and Marine Corps, in that order, to optimize on his future hourly wage rate. He would choose the minimum enlistment period and attempt to improve his general level of education while serving, rather than undertake specific military training.

2. Model 2

The dependent variable in Model 2 was annual income. As stated earlier, Model 2 was superior to Model 1 in that it

gave a better explanation of the variance in total earnings. The "F value" for the resulting equation was also considerably higher. Moreover, a focus on total earnings would seem more appropriate if one is to discover an individual's status achievement in terms of personal security, and total economic well being.

As the value of the Army was contained within the constant, it was again necessary to calculate individual service coefficients. These coefficients computed to:

a. Army: 6.09

b. Navy: (6.09 - .09) = 6.00

c. Air Force: (6.09 + .06) = 6.15

d. Marine Corps: (6.09 - .07) = 6.02

It can be seen that there was a change in the order of returns to service in a particular branch of the military. Air Force moved to first place with Navy to last place. It would appear that while Navy personnel have the potential to earn higher hourly wages, they fail to actually reflect that advantage in total earnings. As both models used and controlled for the same independent variables, the only conclusion is that Navy members do not receive tenure based gratuities and bonuses. An examination of Table 21 shows Navy had the lowest, but not significantly different, length of tenure. However, if this figure had been disaggregated by race it would have possibly proved significant. The basis of this argument is found in Chapter IV, where it was shown that black veterans had an average tenure of 3.58 years compared to white veterans with

4.47 years. The very low percentage of blacks in the Navy should have resulted in a relatively higher tenure for Navy personnel. However, this result failed to materialize. Consequently it is possible to conclude that the lower reported incomes of Navy personnel may be the result of tenure related bonuses which they do not receive.

Using the methodology developed in Model 1, it was found that the average Air Force veteran obtains a 16 percent income advantage over the average Navy member.

$$\frac{e^{6.15} - e^{6.00}}{e^{6.00}} = .161 \simeq 16\%$$

Marine Corps members however, only have a two percent advantage in annual income over Navy personnel;

$$\frac{e^{6.02} - e^{6.00}}{e^{6.00}} = .020 \simeq 2\%$$

When race is examined, white veterans are found to have a 19 percent earnings premium over black veterans. Education, tenure, and weeks of employment, as anticipated, had high positive returns of six, three, and four percent, respectively, to each additional unit possessed of those variables.

Time since active duty gave approximately a three percent return on each extra year since discharge. As time of service became relatively more distant, one would expect that the effects of service life diminish as veterans integrated closer into society. LASTMIL in the equation, however,

may also be capturing some of the effects of age and experience on earnings. As explained earlier, age was highly correlated with LASTMIL. Age/earning profiles which show increasing income over time (age), as produced in Figures 5 and 6 and as developed by Hanoch (1967), would support this reasoning.

Time spent in the military, MILTIME, gave a positive coefficient of .0005, while months spent in additional training, MILTRG, gave a small but negative coefficient of -.0002. Both coefficients could be assumed to be zero as the size and the sign would not be statistically significant. It is of interest to note, however, that these results are similar to those found by DeTray (1980). DeTray in part of his analysis found:

1. The actual period of military service undertaken "neither improves nor worsens civilian wages."
2. "Training received in the military seems to lower civilian wages."

While the first results can be accepted, the second, although small, tend to deny human capital theory. DeTray separated out veterans who said they used military training on their civilian jobs. He still found that trained veterans did not command significantly higher wages than other similar individuals. DeTray's results for military training indicated a negative return of approximately 9 percent. Suggestions for this economically irrational result offered by DeTray are:

1. "Those who received training in the military may differ from those who did not in inate and unobserved ways that lowered their market productivity." DeTray

suggests that possibly veterans without training are not an adequate control group against which to assess the wage rates of veterans who receive training.

2. Those who receive training in the military may initially receive lower wages but may later have wages that increase at a quicker rate over the passage of time.

It is the author's opinion that those with low levels of formal training, e.g., clerical worker, cooks, storemen, drivers, etc., have readily marketable skills that are experience, age, and actual job performance related for payment. Those who receive high levels of training are usually specialized into areas that are military specific and have little civilian comparability. Another possible reason is civilian organizations have already "grown" their own highly skilled workers. Veterans have difficulty entering the market at their skill level unless that particular field is expanding rapidly. As a multivariable approach was utilized in an attempt to control for the effects of "other variables" it is believed the results obtained give a good indication as to the returns veterans may anticipate as a result of their pattern of military service.

E. SUMMARY

The results from this chapter would indicate that the Air Force is possibly the best service to join if post-service earnings are used as the measurement criterion. In addition it would appear that potential recruits should be advised to enlist for one short tour of duty. While in the service he

should undertake general training and use the service system to improve his level of education.

Possibly the most surprising aspect of the results were the returns to training. In 1976 the military devoted 80,000 man years of trainee time, at a cost of $2 billion in initial speciality training [Gay, 1979]. It would appear from this analysis that those typically huge expenditures of time and money in military training have failed to enhance veteran earning power in subsequent civilian employment. The loss of civilian experience and training does not appear to be compensated for by military work experience and training.

For policy makers these results would indicate a need to publicize the values of service training. Certificates of training undertaken with its equivalent qualification should accompany honorable discharges to facilitate the return of a veteran to the civilian sector. In addition, short term enlistments, 2 years, with post-service education benefits for occupations that are military specific, e.g., infantry, could be offered. This may be an attractive alternative to young men who cannot afford a college education, but do not want to invest four years of their time in the military.

VII. SUMMARY CONCLUSIONS AND RECOMMENDATIONS

It's Tommy this an' Tommy that, an'
"Tommy, wait outside,"
But it's "Special train for Atkins" when
the trooper's on the tide.

It's Tommy this an' Tommy that, an'
"Chuck, him out the brute!"
But it's "Saviour of 'is country" when
the guns begin to shoot.

Rudyard Kipling 1865-1936

A. SUMMARY

The value of a tour of military duty as a method of investing in human capital was analyzed in this thesis. Conclusions presented in this section are based on information gathered in 1976 by a national longitudinal survey of young men aged 14 to 24 in 1966.

The first part of this study reviewed the principles of Human Capital Theory. Using the concepts of specific and general training as a method of accumulating human capital, it was predicted that those who undertake military service should receive earning premiums for this training in their post service occupations.

Eight previous studies that have examined returns to veterans in post service employment were reviewed. Only two

of the studies, Cutright (1972) and Bolin et al., (1980), came to the conclusion that military service provided no post service premiums. Studies by sociologists, Browning et al., (1973), Lapreato et al., (1972) and Martindale et al., (1979) concluded that for minority groups, military service provides a "bridging environment" giving veterans substantial advantage in their post service earnings. The literature review highlights the fact that results are highly dependent upon the samples investigated and methodology utilized. Thus, similar conclusions and consensus of opinion are difficult to obtain.

Chapter III of this study detailed the hypotheses to be tested, the methodology to be employed, and the data base used. Chapter IV examined the association of factors considered important in their contribution to earnings with veteran status and race. The general conclusions drawn from this analysis were that black veterans were superior to black non-veterans in earning characteristics, while the reverse was true for whites. These results were consistent with a study conducted by Reaghard (1980). Chapter IV concludes that the military, during the period 1960 to 1976, was not representative of the population from which it was drawn.

In the next chapter multiple regression analysis was used to determine returns to veteran status. It was found that veteran status, regardless of race, had a negative post-service earnings influence of approximately $9 per week, in 1976. For whites that negative influence extended over a period in excess of seven years after the completion of their military

service. These findings were consistent with Cutright (1972) and Bolin et al., (1980). In particular, the results of this thesis, even though cross-sectional for 1976, enhance the Bolin et al., (1980) study which utilized the same NLS data base, but used 1969 and 1971 data. This analysis, combined with the Bolin et al., study, would indicate a longitudinal trend of negative returns to veterans of the Vietnam period. Those veterans who do not improve their education or vocational training during or on completion of military service have poorer earning prospects on their return to the civilian sector, compared to veterans undertaking vocational training or furthering their education.

Of particular interest were the results for black veterans, who though superior in many factors over their non-veteran counterparts, still had an earnings penalty associated with their military service. This result directly conflicts with Martindale et al., (1979). Reasons for this apparent contradiction appear to be the sample selection and the methodology utilized. It was also shown that length of training and length of service in the military were not associated with positive returns. Length of enlistment detracts from the ability to gain civilian job tenure, which had positive returns.

B. CONCLUSIONS

The results of this study would infer that military service is not a good method of investing in human capital. Future earnings are not enhanced by military service. This finding

is consistent with Cutright's and Bolin, Hess and Little's conclusions. This thesis also supports Reaghard's results that during the 1960's and early 70's better "quality" blacks were in the military, but "poorer" quality whites entered military service.

It would seem the "better" whites could generally afford to avoid the draft, possibly through their easier access to tertiary education. The "better" blacks, however, who perhaps could not afford this extra education were drafted or enlisted in the military. Unfortunately, both the whites and blacks who join the military for non-careerist reasons would have been better off economically had they been able to spend their time gaining work experience or education in the civilian sector.

In summary, it can be argued that the average veteran who completed a tour of military in the 1960's and early 1970's has not benefited financially in his post-service period. Further, a selective service program that removes members from the civilian sector and pays a minimal wage during this period imposes not only a "conscription tax" on those who serve, but also depresses their earnings in the post-program period.

Additional research is required to determine whether current incomes earned during military service have compensated for losses sustained in the post service environment. This type of analysis should be possible with the new NLS surveys. The new NLS, of young men and women aged 14 to 21 in 1979, surveys not only members currently serving in the military,

but will also survey members during military service should they choose to enlist. With these data it will be possible to compare members of comparative ability before, during, and after military service. Construction of lifetime earning paths that will be possible from these data should be able to assess the cost and benefits of military service under the all volunteer force [Kim, 1980].

Moreover, as the new survey period will cover the era of the All Volunteer Force, interest will also be focused on the "quality" of personnel the services are able to recruit when faced by a competitive labor market. Additional interest in this survey should also come from its ability to answer questions related to military service and women.

C. RECOMMENDATIONS

Policy recommendations determined as a result of this analysis are;

1. Information to employers and formal accreditation of military personnel for both formal and on-the-job training received during military service is urgently required. This certification and recognition of veterans qualifications could ease the veterans transition back into the civilian sector.

2. The government needs to compensate adequately those who serve in the military with either higher wages and/or better post service benefits to reduce financial post service loss. If the implication of being in the Individual Ready Reserve are also considered, it would seem that country is not

only financially disadvantaging non-career veterans but, in addition, is expecting them as a result of their military service to be the first to answer the call should the country go to war.

LIST OF REFERENCES

Becker, Gary S., Human Capital, A Theoretical and Empirical Analysis with Special Reference to Education, Columbia University Press for the National Bureau of Economic Research, New York (1964), 1975.

Binkin, M. and Kyriakopoulos, I., Youth or Experience, Brookings Institute, Washington, D.C., 1979.

Blaug, Mark, "The Empirical Status of Human Capital Theory: A Slightly Jaundiced Survey," Journal of Economic Literature, 14, p. 827-55. September 1976.

Blinder, Alan S., "Wage Discrimination: Reduced Form and Stuctural Estimates," Journal of Human Resources, 8 p. 436-55, (Fall 1973).

_____, "On Dogmatism in Human Capital Theory," Journal of Human Resources, 8-22, (Winter 1976).

Bolin, Phil W., "Military Service and Military Vocational Training Effects on Post-Service Earnings," Master's Thesis, Naval Postgraduate School, June 1980.

Bolin, P., Hess, M., & Little, R., "Military Vocational Training: Its Impact on the Post-Service Earnings Path," unpublished paper, Naval Postgraduate School, September 1980.

Borach, J.I., Forecasting the Supply of Women Available to the Navy, San Diego. Navy Personnel Research and Development Centre (NPRDC TR 80-31), August 1980.

Browning, H.L., Lopreato, S.C., and Poston, D.L., "Income and Veteran's Status: Variations Among Mexican Americans, Blacks and Anglos," American Sociological Review, V. 38, p. 74-85, February 1973.

Clark, Harold F., and Sloan, Harold S., Classrooms in the Military, Bureau of Publications, Teachers College, Columbia University, New York, 1964.

Cohen, J. and Cohen, P., Applied Multiple Regression/Correlation Analysis for the Behavior Sciences. Hulscale, New Jersey: Lawrence Erlbaum Associates, 1975.

Congressional Budget Office, The Cost of Defense Manpower: Issues for 1977, January 1977.

Cutright, Phillip, Achievement, Mobility and the Draft: Their Impact on the Earnings of Men, Social Security Administration, U.S. Department of Health, Education, and Welfare, Washington, D.C., DHEW Publication No. (SSA) 73-11854, June 1972.

Cutright, P., "The Civilian Earnings of White and Black Draftees and Nonveterans," American Sociological Review, V. 39, p. 317-327, June 1974.

DeTray, D.N., "Veteran Status and Civilian Earnings," RAND Corporation Paper, ARPA Order Nr. 3478, R-1929-ARPA. The RAND Corporation: Santa Monica, CA., March 1980.

Fleisher, B., & Kniesner, T., Labor Economics: Theory, Evidence and Policy. Prentice Hall, New Jersey, 1980.

Fligstein, N.D., "Who Served in the Military 1940-73," Armed Forces and Society, 1980, Vol. 6, number 2.

Fredland, J.E., and Little, R.D., "Long-Term Returns to Vocational Training: Evidence from Military Sources," Journal of Human Resources, V. 15, P. 49-66, 1980.

Gay, R.M., and Albrecht, M.J., "Measuring On-the-Job Performance in Military Occupations," in R.V.L. Cooper (ed.), Defense Manpower Policy: Presentations from the 1976 Rand Conference on Defense (R-2396-ARPA), RAND, December 1978.

Griliches, Zri, and Mason, William M., "Education, Income and Ability," J. Polit. Econ., Vol. 80, Pp. S74-S103. May-June 1972.

Griliches, Z., "Estimating the Returns to Schooling: Some Econometric Problems," Econometrica, 45, P. 1-22, January 1977.

Hanoch, Giora, "An Economic Analysis of Earnings and Schooling," J. Human Res., Vol. 2, Pp. 310-329, Summer 1967.

Hansen, W. Lee and Weisbrod, Burton A., "Economics of the Military Draft," Quarterly Journal of Economics 81, P. 395-421. August 1967.

Hess, Mark W., "From School to Work Via Military Service: An Improved Transition," Master's Thesis, Naval Postgraduate School. June 1980.

Kim, ., Nestel, G., Phillips, R., and Borus, M., The All-Volunteer Force: An Analysis of Youth Participation, Attrition, and Reenlistment. Center for Human Resources Research, the Ohio State University, May 1980.

Kohen, A.I., Code Book Supplement, Center for Human Resources Research, Ohio State University, Columbus, 1976.

Knapp, Charles B., "The Effects of Military Experience on Postservice Earnings Without the Draft." In Richard L.V. Cooper (Ed.), Defense Manpower Policy: Presentations from the 1976 Rand Conference on Defesne Manpower (Santa Monica, CA: Rand Corporation, 1979).

Little, R.D., and Fredland, J.E., "Veteran Status, Earnings, and Race: Some Long Term Results," Armed Forces and Society, V. 5, Pp. 244-260, February 1979.

Lockman, R.F., "A Model for Estimating Premature Losses," in R.V.L. Cooper (ed.), Defense Manpower Policy. Presentation from the 1976 Rand Conference on Defense (R-2396-ARPA), Rand, December 1978.

Lopreato, S.C. and Poston, D.L., "Differences in Earnings and Earnings Ability Between Black Veterans and Nonveterans in the United States," Social Science Quarterly, V. 57, Pp. 750-766, March 1977.

Martindale, Melanie and Poston, Dudley L. Jr., "Variations in Veteran/Nonveteran Earnings Patterns Among World War II, Korea, and Vietnam War Cohorts," Armed Forces and Society 5, Pp. 219-43 (Winter 1979).

Mincer, J., "On-the-Job Training: Costs, Returns, and Some Implications," Journal of Political Economy, V. 70, Pp. 50-79, October 1962.

_____, Schooling, Experience and Earnings, New York: Columbia University Press for the National Bureau of Economic Research, 1974.

Mobley, W.H., "Review and Conceptual Analysis of the Employee Turnover Process," Psychological Bulletin, V. 86, P. 493-522, No. 3, 1979.

Moskos, C.C., Jr., The American Enlisted Man, Russell Sage Foundation, New York, 1970.

_____, "The Enlisted Ranks in the All-Volunteer Army." In J.B. Keeley (Ed.), The All-Volunteer Force and American Society. Charlottesville: University Press of Virginia, 1978.

_____, Serving in the Ranks: Citizenship and the All-Volunteer Force. Paper prepared for the All-Volunteer versus Conscription Conference, Hoover Institution on War, Revolution and Peace, Stanford, 13-16 December 1979.

Nie, N.H., Hull, C.H., Jenkins, J.G., Steinbrenner, K., and Bent, D.J., Statistical Package for the Social Sciences (2nd Ed.), New York: McGraw-Hill Book Company, 1975.

Norrblom, E., The Returns to Military and Civilian Training, The Rand Corporation, R-1900-ARPA, July 1976.

_____, An Assessment of the Available Evidence on the Returns to Military Training, The Rand Corporation, R-1960-ARPA, July 1977.

Oi, W.Y., "The Economics of the Draft," American Economic Review, V. 57, Pp. 39-63, May 1967.

Reaghard, J.A., "Socioeconomic Representativeness and the Draft," Master's Thesis, Naval Postgraduate School, June 1980.

Renshaw, E.F., "The Economics of Conscription," The Southern Economic Journal, V. 27, Pp. 111-117, October 1960.

Schultz, Theodore W., The Economic Value of Education, New York: Columbia University Press, 1963.

_____, Investment in Human Capital, The Free Press, New York, 1971.

Siegel, Sidney, Nonparametric Statistics for the Behavioral Sciences, McGraw Hill, New York 1956.

U.S. Department of Defense, Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics), America's Volunteers: A Report on the All-Volunteer Armed Forces. Washington, D.C.: Author, 1978.

Wonnacott, R. & Wonnacott, R., Introductory Statistics, John Wiley and Sons, New York, 1977.

INITIAL DISTRIBUTION LIST

		No. Copies
1.	Defense Technical Information Center Cameron Station Alexandria, VA 22314	2
2.	Library, Code 0142 Naval Postgraduate School Monterey, CA 93940	2
3.	Department Chairman, Code 54 Department of Administrative Sciences Naval Postgraduate School Monterey, CA 93940	2
4.	Prof. G. Thomas, Code 36Te Department of Administrative Sciences Naval Postgraduate School Monterey, CA 93940	3
5.	Professor Richard Elster, Code 54Ea Department of Administrative Sciences Naval Postgraduate School Monterey, CA 93940	1
6.	Defense Logistics Studies Information Exchange U.S. Army Logistic Management Center Fort Lee, VA 23801	1
7.	Major S.G. Chamarette DPP, Russell Offices, Canberra, 2600 ACT, AUSTRALIA	3
8.	The Librarian Department of Defence Library Russell Offices Canberra, ACT 2600 Australia	1
9.	The Librarian Department of Defence (Army Office) Library Campbell, Park Offices Canberra, ACT 2600 Australia	1

10. The Librarian
Bridges Memorial Library
Royal Military College
Duntroon, ACT 2600
Australia 1

Thesis
C3395 Chamarette
c.1 Military service as a determinant of post-service earnings.

192525

DUDLEY KNOX LIBRARY
3 2768 00031113 8